Quality Assurance Program for CDA/Design-Build Projects

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Texas Department of Transportation

Contents

1 Introduction

1.1 Overview

The Quality Assurance Program (QAP) for Comprehensive Development Agreement (CDA)/Design-Build Projects (hereafter referred to as "the DB QAP"), established by the Texas Department of Transportation (TxDOT), ensures that materials and workmanship incorporated into the highway construction project are in reasonable conformance with the approved plans and specifications, including any approved changes.

Projects must use the recommended Owner Verification (OV) Levels for Materials Testing Validation/Verification in Appendix D. Any proposed changes to the OV levels of analyses shall be discussed during a project-specific materials and inspection risk assessment workshop. Modifications to the OV Levels for Materials Testing Validation/Verification will require approval from the TxDOT Materials and Tests Division (MTD) and Federal Highway Administration (FHWA).

This program is developed based on 23 CFR § 637B and FHWA Technical Advisory T6120.3, available at the following links:

- 23 CFR § 637 Subpart B; and
- Technical Advisory 6120.3.

The QAP consists of a Quality Control (QC) Program (Section 2), an Acceptance Program (Section 3), and an Independent Assurance (IA) Program (Section 4). The QAP allows for the use of contractor-performed Independent Quality Firm (IQF) test results as part of an acceptance decision **only if the IQF's results are verified by the OV testing results by TxDOT**.

The purpose of the QAP is to provide statewide consistency and a programmatic approach to Quality Assurance (QA) for design-build projects where the design-build contractor's (DB Contractor's) test results are used in the acceptance decision, regardless of how the project is funded. It clarifies federal requirements relating to QA and owner verification. Any modification to a project-specific DB QAP requires review and approval by TxDOT and FHWA 90 days before construction starts.

The use of IQF test results as part of the acceptance decision should be carefully evaluated for each project because a significant TxDOT Owner Verification Program is instrumental to project success.

Acronyms and definitions for terms used in this QAP are provided in Appendix A.

The QAP comprises several components, and the relationships between the parties and functions are shown in Figure 1.

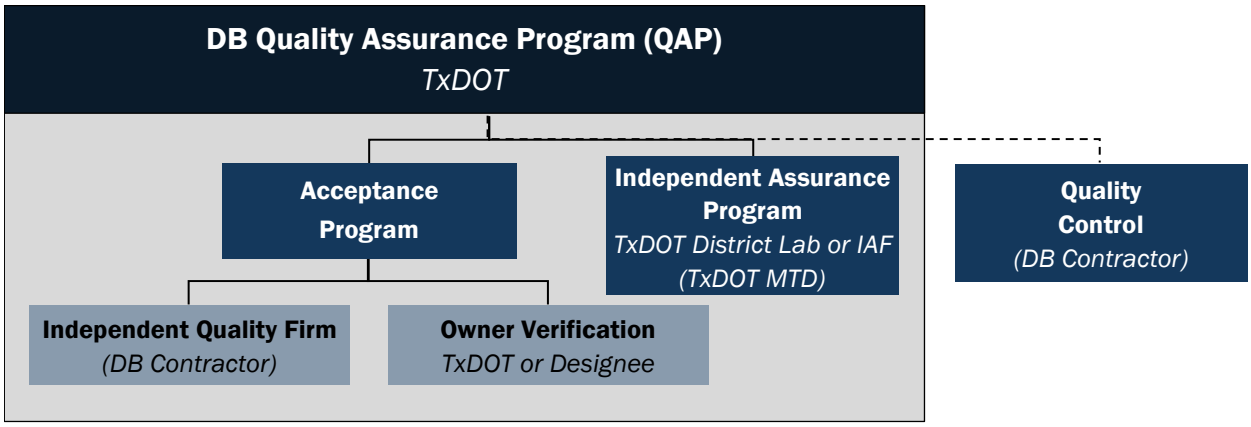


Figure 1: Components (Reporting Relationship) in the QAP.

1.2 Construction Quality Management Plan

The DB Contractor's Construction Quality Management Plan (CQMP) shall include QC and IQF requirements with respect to performance of the Work. Section 2 – Quality Control Program describes requirements for the QC portion of the CQMP. Section 3 – Acceptance Program describes requirements for the IQF portion of the CQMP. The CQMP shall establish a clear distinction between QC and IQF activities, and the persons performing each function will not be the same. The DB Contractor shall submit the CQMP to TxDOT for review and approval. The CQMP shall be approved before construction starts.

1.3 Owner Verification Testing and Inspection Plan

TxDOT's Owner Verification Testing and Inspection Plan (OVTIP) will describe TxDOT's commitments to perform OV of the DB Contractor's IQF testing and inspection. Section 3 – Acceptance Program describes requirements for the OVTIP. The OVTIP must be submitted to TxDOT for review and approval. The OVTIP shall be approved before construction starts.

1.4 Conflict of Interest

To avoid an appearance of a conflict of interest, any non-TxDOT entity will perform only one of the following functions on the same project:

- QC testing and inspection;
- IQF testing and inspection;
- OV testing and inspection;
- IA testing; or
- Referee testing.

2 Quality Control Program

2.1 General

The DB Contractor will be responsible for the quality of the Work. Project quality will be enhanced through the daily efforts of all the workers involved with the Work, supported by the DB Contractor's CQMP. The DB Contractor's QC portion of the CQMP will include the internal procedures used by the DB Contractor to ensure that the Work is delivered in accordance with the Contract Documents, Early Start of Construction (ESOC) plans, temporary work plans, Released-for-Construction (RFC) plans, approved working and shop drawings, and specifications. This involves the active participation of the entire workforce in working to achieve "quality" initially and to minimize or eliminate re-work. The DB Contractor's QC will not be part of the Acceptance Program.

2.2 DB Contractor Quality Control Requirements

The DB Contractor's CQMP will establish a systematic approach to define the processes, methods, procedures, and documentation for delivery of QC on the project. The CQMP will be International Organization for Standardization (ISO) 9001-2015-compliant for quality systems, quality plans, and quality audits, including methods and procedures that clearly define the authority and responsibility for the administration of the DB Contractor's QC portion of the CQMP.

2.2.1 Staffing

During periods of construction, the DB Contractor will assign an on-site Construction Quality Control Manager (CQCM) responsible for management of the QC portion of the CQMP. The CQCM will not be involved with scheduling or production activities and will report directly to the DB Contractor's management team. The CQCM will ensure that the methods and procedures contained in the approved CQMP are implemented and followed by the DB Contractor and Subcontractors in the performance of the Work. The CQCM shall have a minimum of 10 years of experience on projects of similar complexity.

The DB Contractor's and Subcontractor's construction workforce is considered to be members of the DB Contractor's QC staff, as each member is responsible for the quality of the Work. Personnel responsible for performing the QC inspection will be independent from IQF personnel, be knowledgeable in their duties, and receive documented training. Personnel performing QC sampling and testing will be knowledgeable in the testing methods and procedures. IQF personnel will not perform duties on behalf of QC personnel, although IQF equipment can be shared with QC personnel.

Although not used for the acceptance decision, documented QC testing and inspection will ensure quality has been incorporated into all elements of Work before requesting IQF testing and inspection. The QC Program should be sufficient in scope to pre-empt and avoid repeated discoveries—by TxDOT, IQF personnel, or DB Contractor QC staff—of Nonconforming Work. Repeated discoveries in any specific area of Nonconforming Work documented in Construction Deficiency Reports (CDRs) or Non-Conformance Reports (NCRs) or excessive use of Engineering Judgment (EJ) will be considered a breakdown of the QC Program and will be cause for investigation and corrective action before recommencement of Work in areas affected. Corrective action may include the addition of new QC

procedures, revision to existing QC procedures, re-training of QC personnel, removal and replacement of QC personnel, or other such actions that will restore the effectiveness of the QC Program.

2.2.2 CQMP Requirements

As it relates to QC, the DB Contractor's CQMP will clearly address, at minimum, how the DB Contractor's QC staff will address the following requirements.

A. A construction QC organizational chart and staffing plan, which will include the time periods when the QC staff members will be present on the site and the experience, knowledge, and skill levels of QC staff;
B. Procedures to ensure that the education, training, and qualification of personnel performing CQMP activities are achieved and maintained, and that all Work is performed in accordance with the designs, plans, and specifications;
C. Procedures to ensure that the DB Contractor, Suppliers, and Subcontractors designate individuals on each crew responsible for performing daily field inspections of their own Work and for preparing a daily QC report to document the inspection performed. Report forms to be used by the responsible QC personnel will be included in the DB Contractor's CQMP;
D. Documents specifying that all activities undertaken by or on behalf of the DB Contractor affecting the quality of the Work will be prescribed and accomplished by documented instructions, procedures, and appropriate drawings. Such instructions, procedures, and drawings will include quantitative and qualitative criteria to be used to determine compliance;
E. Procedures to ensure that elements of the Work are not started or continued without formal communication with the Independent Quality Firm Manager (IQFM). Inspection or hold points must be identified and communicated to the IQFM, CQCM, and TxDOT. Procedures to progress beyond the inspection or hold points will be developed. The hold points will include, at minimum, those described in Appendix J. TxDOT will be provided the same advance notice as the IQF for all hold points. Milestones will be established at convenient opportunities to inspect the Work and to prevent significant cost of correction. No work may be covered until it has been subjected to hold point acceptance by IQF personnel. The DB Contractor will not advance the Work or proceed at risk beyond the current hold point where: (i) there is one NCR or more with a resolution that has not yet been proposed by the DB Contractor and accepted by the Engineer of Record (EOR) and TxDOT; or (ii) the Work will become inaccessible to the IQF and Owner Verification Firm (OVF). The IQFM and TxDOT may agree to modify established hold points to meet the needs of the project;
F. Procedures for inspecting, checking, and documenting the Work. Inspection, examinations, and measurements will be performed for each operation of the Work to assure quality;
G. Procedures for identification and control of materials, equipment, and elements of the Work. These procedures will ensure that identification of an item is maintained by appropriate means, either on the item or on records traceable to the item, as necessary, throughout fabrication, erection, installation, and use of the item;
H. Procedures to ensure that materials, equipment, or elements of the Work that do not conform to requirements of the Contract Documents, the Governmental Approvals, applicable Law, or the Design Documents are not used or installed. These procedures will include identification, documentation, segregation, disposition, and notification to TxDOT, and, if appropriate,

Governmental Entities and other affected third parties, as well as procedures for TxDOT to review Nonconforming Work and Construction Deficiency Items;

I. Procedures for processing a Request for Information (RFI) to resolve discrepancies or questions on the plans and specifications so that all changes are documented and approved by the EOR. Work cannot proceed until the RFI or Notice of Design Change (NDC) has been approved by the EOR;

J. Procedures to indicate—by the use of markings such as stamps, tags, labels, routing cards, or other suitable means—the status of inspections and tests performed on individual items of the Work;

K. A program for coordination of all IQF inspections and testing with Governmental Entities and Utility Owners;

L. A program to ensure performance of all testing required to demonstrate that all materials, equipment, and elements of the Work will perform satisfactorily for the purpose intended and meet the standards specified in the Contract Documents. The program will specify written test procedures that include provisions for ensuring that all prerequisites for the given test have been met and that adequate test instrumentation is available and used. The CQMP will require that test results be documented and evaluated by the CQCM to ensure that test requirements have been satisfied;

M. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified, and adjusted at specified periods to maintain accuracy within industry standards. Malfunctioning equipment or equipment out of calibration shall be tagged and placed out of service until it is repaired or calibrated;

N. The preparation of all Portland cement concrete, soil-lime treatment (stabilization or modification), soil-cement treatment, and Hot-Mix Asphalt (HMA) mix designs must be performed by personnel who hold the required certifications as specified in the Contract Documents. Additionally, the mix designs will be reviewed and sealed by a licensed professional engineer in the State of Texas attesting that the design meets TxDOT requirements for the specified class or grade for which it was prepared. Concrete mix designs will be reviewed and approved by either a licensed professional engineer in the State of Texas or personnel qualified in TxDOT Concrete Mix Design Review/Approval certification (MTD202 and HCCMXDES14);

O. Sampling and testing of all materials during the production or manufacturing processes so that only materials meeting the specifications are supplied for ultimate incorporation into the Work;

P. Procedures to control the handling, storage, shipping, cleaning, and preservation of materials and equipment to prevent damage or deterioration;

Q. Procedures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, defective material and equipment, deviations, and other Nonconforming Work and Construction Deficiency Items, are promptly identified and corrected. The procedures will ensure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken will be documented and reported in writing to TxDOT and to appropriate levels of the DB Contractor's management to ensure corrective action is promptly taken;

R. Measures to control the receipt and issuance of documents, such as instructions, procedures, training manuals, and drawings, including changes thereto, that prescribe activities affecting quality. These measures will ensure that approved documents, including authorized changes thereto, are reviewed for adequacy and approved for release by authorized personnel of the DB Contractor and are distributed to and used at the location where the prescribed activity is performed. Changes to documents will be reviewed and approved by the same organizations that performed the original review and approval, unless TxDOT consents in writing to another responsible organization;

S. Requirements and methods for controlling documents;

T. Procedures for checking and verifying the accuracy and adequacy of construction stakes, lines, and grades established by the DB Contractor; and

U. Procedures for ensuring that construction alignment and grades are in accordance with the requirements contained in the TxDOT Survey Manual.

2.2.3 Reporting, Record Keeping, and Documentation

The DB Contractor will maintain construction workmanship and materials quality records of all inspections and tests performed per the approved CQMP. These records will include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, and causes for rejection; proposed remedial action; and corrective actions taken. These records will cover conforming and defective or deficient features, and will include a statement that all supplies and materials incorporated in the Work are in full compliance with the terms of the Contract Documents. These records shall be furnished to TxDOT in an electronic format specified in the CQMP.

All QC inspection reports (including plant/source inspection reports), process control material sampling and testing results, and HMA control charts (for every sublot of each mix) will be posted on the DB Contractor's document control system within 48 hours following the inspection or test. DB Contractor personnel will either provide TxDOT with access to their system or submit their QC results to TxDOT's approved Electronic Content Management System (ECMS) in an acceptable format as directed by TxDOT for reviewing the QC results.

3 Acceptance Program

3.1 General

The testing and inspection frequencies for this QAP that are used in the Acceptance Program are based on a project risk profile that includes the following:

- Scope of the project;
- Public (TxDOT or FHWA) funding; and
- Appreciable schedule acceleration, relative to conventional design-bid-build.

The DB Contractor's CQMP shall include the internal procedures used by the IQF to ensure that the Work is inspected and tested to verify compliance with the Contract Documents. The DB Contractor's IQF shall be separate from the DB Contractor's QC Program.

TxDOT's OV Program will include internal procedures used by TxDOT to ensure that the DB Contractor's IQF program is performed in accordance with the approved CQMP and to validate or verify IQF testing and inspection. TxDOT will decide the extent and applicable use of EJ and may delegate engineering authority for such decisions to the IQFM in writing.

The IQF and OVF testing and inspection results together are the basis for the acceptance decision. IQF testing results may be used for acceptance when they are either statistically validated or verified by the OVF testing results. Independent Quality (IQ) activities are performed by the IQF, and OV is performed by TxDOT or its designee.

3.1.1 TxDOT-Performed Materials Acceptance

TxDOT uses monitored materials from various manufacturers and producers. The list of TxDOT-monitored materials is maintained on the Material Producer List (MPL), and the IQF can use results from TxDOT's MPL. For materials listed on the MPL, the IQF shall perform job control tests as defined by the TxDOT *Guide Schedule of Sampling and Testing for Design-Build Projects* (DB Guide Schedule). For example, mechanical couplers and multiple-piece tie bars, although on the MPL, shall still be tested as described in DB Guide Schedule before installation of the item into any product.

Materials that are not monitored or not pre-approved by TxDOT are subject to sampling and testing as noted in the DB Guide Schedule, applicable Material Quality Program, and Departmental Material Specification (DMS) for approval of the material and job control tests as defined in the DB Guide Schedule. These materials shall be approved by TxDOT before use. The IQF shall audit and verify that materials delivered to the project site are in conformance with approved material submittals. TxDOT Form 1818 (Material Statement), manufacturers' warranties, mill test reports, guarantees, instruction sheets, parts lists, and other materials that are furnished with articles or materials incorporated into the Work shall be collected and compiled by the IQF and submitted to the OVF upon request.

The DB Contractor shall comply with all Buy America and Build America (BABA) Act requirements as described in the Contract Documents. The DB Contractor will submit the required Buy America documentation to the IQF and OVF for review and audit.

The DB Contractor shall, at TxDOT's request, furnish additional samples of materials to be incorporated into the Work.

TxDOT also maintains a list of approved prefabricated product fabrication plants on the MPL. For prefabricated product fabrication plants, see Section 3.2 - Prefabricated Product Fabrication Plants. Follow the applicable DMS Program for inspection, sampling, and testing requirements.

3.2 Prefabricated Product Fabrication Plants

For plants monitored or pre-approved by TxDOT MTD, Prefabricated Structural Materials Section, TxDOT may or may not perform inspection and testing at MPL-approved prefabricated product fabrication plants. Final determination is on a case-by-case basis at TxDOT MTD's sole discretion. Follow Section 3.2.1 - TxDOT MTD Performs Services (MPL-Approved Plant) and Section 3.2.2 - TxDOT MTD Does Not Perform the Services (MPL-Approved Plant) when using prefabricated product fabrication plants listed on TxDOT's MPL. Follow Section 3.2.3 - TxDOT MTD Does Not Perform the Services (Non-MPL-Approved Plant) when using fabrication plants not listed on TxDOT's MPL.

At least 60 days before construction Work, the DB Contractor shall submit TxDOT's Design Build Prefabricated Product Notification form to TxDOT MTD, Prefabricated Structural Materials Section, identifying the prefabricated products that the DB Contractor intends to request with TxDOT MTD's inspection services. This notification form is located at www.txdot.gov/business/resources/materials.html.

The DB Contractor shall, at TxDOT's request, furnish additional samples of materials to be incorporated into the Work. Manufacturers' warranties, mill test reports, guarantees, parts lists, and other materials that are furnished with products incorporated into the Work shall be collected and compiled by the IQF and submitted to the OVF when following Section 3.2.2 - TxDOT MTD Does Not Perform the Services (MPL-Approved Plant) and Section 3.2.3 - TxDOT MTD Does Not Perform the Services (Non-MPL-Approved Plant). The DB Contractor shall comply with all BABA Act requirements as described in the Contract Documents. The DB Contractor will furnish the required Buy America documentation to the IQF and OVF for review and audit.

The IQF shall ensure that material on hand is paid for only after sampling, testing, and inspection for each fabricated member or lot prove that the material meets all specification requirements, and all required documentation is completed along with the OVF's verification.

Supplier's QC, IQF, and OVF inspection, sampling, and testing results shall be independently performed and separately documented, dated, and signed.

The Supplier shall have at least one year of experience in producing applicable TxDOT product and meeting all TxDOT project specifications to be considered for qualification on the applicable TxDOT MPL. Fabricating prefabricated product for a design-build project does not constitute MPL approval.

3.2.1 TxDOT MTD Performs Services (MPL-Approved Plant)

As may be requested in advance by the DB Contractor and agreed upon by TxDOT MTD, Prefabricated Structural Materials Section, the DB Contractor can cooperatively use TxDOT resources for materials testing and product inspection services at a point in Texas where the State routinely provides resident

inspection services for its own highway materials, and at other locations throughout the contiguous United States. Upon election by the DB Contractor to use TxDOT MTD, Prefabricated Structural Materials Section, services, the DB Contractor shall prepare Design-Build Prefabricated Product Inspection Work Requests in full compliance with the terms of the Contract Documents.

If TxDOT services are agreed upon, the DB Contractor is responsible for having the manufacturers and producers furnish their scheduling of Work to TxDOT MTD, Prefabricated Structural Materials Section, and provide a minimum 30-day notice for performance of the services. Election to use and rely upon TxDOT MTD services is at the DB Contractor's own option and risk. No time extension or additional compensation will be granted for issues arising from the use of TxDOT resources.

Before the start of fabrication of prefabricated products, the DB Contractor shall submit a Design-Build Prefabricated Product Inspection Work Request form to TxDOT MTD, Prefabricated Structural Materials Section, requesting inspection. The DB Contractor shall submit the work request forms at least 30 days before TxDOT MTD performs any inspections. Each work request shall be fabricator-specific and list all the prefabricated products requested to be inspected by TxDOT MTD. TxDOT will direct all invoices, test reports, and questions pertaining to any Design-Build Prefabricated Product Inspection Work Request to the point of contact listed on the notification form. The DB Contractor shall provide written notification of a change to the point of contact. The DB Contractor shall be responsible for all direct and indirect costs, and expenses, involved in the performance of TxDOT's services. The work request form is located at www.txdot.gov/business/resources/materials.html.

When prefabricated products are damaged during shipment and repairs are performed at the jobsite, the DB Contractor shall coordinate with the fabricator to determine which party will perform the repairs. The CQCM shall be present for all such repairs, with documentation uploaded in accordance with Section 2.2.3 - Reporting, Record Keeping, and Documentation. If requested by TxDOT, the IQF or OVF will be present and witness all repairs.

3.2.2 TxDOT MTD Does Not Perform the Services (MPL-Approved Plant)

Supplier's certified QC personnel perform 100% inspection, sampling, testing, documentation, and certification of product. The Supplier's certified QC personnel shall perform these responsibilities in accordance with the applicable DMS, Material Quality Program, specifications, and Contract Documents.

In addition, the IQF shall independently perform and document, at minimum, 20% of Supplier's QC inspection, sampling and testing, and verification of all QC responsibilities. The IQF will conduct inspection, sampling, and testing at a higher frequency as directed by TxDOT during startup operations and when non-compliance products or processes are encountered. The higher inspection and testing frequency may be lowered if documented inspection and test results indicate the non-compliance issues are resolved and corrective measures are implemented and maintained. At no time shall the IQF's inspection, sampling, testing, and documentation frequency be lower than 20%.

When products are damaged during shipment, the IQF will inspect all repairs and document acceptance in accordance with Section 3.5.6 - Reporting, Record Keeping, and Documentation.

The OVF, as directed by TxDOT, will perform on-site audits, including independent inspection and testing, during production for the Project to verify Supplier's QC and the IQF's inspection and testing results, and review all required documentation to verify compliance with the Contract Documents and CQMP.

Supplier's QC and IQF inspection, sampling, and testing results will be used to form the basis for the acceptance decision.

Supplier's QC and IQF personnel certifications shall be in accordance with the specifications, applicable Material Quality Program, and DMS. The required certifications shall be obtained before fabrication of any product.

During initial startup of production, the IQF (and OVF when directed by TxDOT) shall audit the fabrication plant and verify that the products delivered to the project site conform to approved material procedures, submittals, and related specifications.

At the IQF and OVF's request, TxDOT MTD will supply existing audit checklist templates and standard product certification forms. Existing checklists may be modified, or new checklists created, if not available, to meet project requirements. Checklists and standard product certification forms shall meet or exceed TxDOT's requirements. These documents shall be part of the CQMP and require TxDOT's approval.

3.2.3 TxDOT MTD Does Not Perform the Services (Non-MPL-Approved Plant)

When the DB Contractor uses prefabricated product fabrication plants not listed on TxDOT's MPL, the IQF shall perform 100% of inspection, sampling, testing, and documentation. The OVF will perform, at minimum, 20% of the IQF's inspection, sampling, testing, and documentation frequency.

The OVF will conduct inspection, sampling, and testing at a higher frequency during startup operations and when non-compliance products or processes are encountered. The higher inspection and testing frequency may be lowered if documented inspection and test results indicate the non-compliance issues are resolved and corrective measures are implemented and maintained. At no time shall the OVF's inspection, sampling, testing, and documentation frequency be lower than 20%.

Before the start of production for the Project, the IQF and OVF shall audit the fabrication plant. The Supplier's processes and the products audited shall be representative of the products required for the Project. If the product or processes are not representative, the IQF and OVF shall perform the audit at initial startup of fabrication, and verify products are delivered to the Project site in conformance with approved submittals and related specifications.

The IQF and OVF's inspection, sampling, and testing results will be used to form the basis for the acceptance decision. The Supplier's QC inspection, sampling, and testing results will not be factored into product acceptance decisions. The IQF shall provide to TxDOT copies of required documentation as defined by the TxDOT Standard Specifications, the applicable DMS, and other applicable specifications and documents required by the Contract Documents.

At the IQF and OVF's request, TxDOT MTD will supply existing audit checklist templates and standard product certification forms. Existing checklists shall be modified, or new checklists created, if not available, to meet project requirements. Checklists and standard product certification forms shall meet or exceed TxDOT's requirements. These documents will be part of the CQMP and require TxDOT's approval.

The IQF will complete and sign product certification forms. The OVF will complete and sign its own independent product certification form and use its own documented inspection and test results to verify the IQF's results when product is accepted for use in the Work.

3.2.4 Staffing and Facility Requirements

3.2.4.1 Supplier Requirements

Supplier's QC testing and inspection shall ensure quality has been incorporated into all elements of the Work, even when the supplier's QC inspection and testing results are not used for acceptance. The Supplier's QC Program should be sufficient to pre-empt and avoid repeated discoveries of deficiencies or non-conformances by TxDOT, the OVF, the IQF, or the Supplier's QC personnel. At the sole discretion of TxDOT, repeated occurrences of Nonconforming Work, CDRs, and NCRs, or excessive use of EJ, shall be considered a breakdown of the Supplier's QC Program. Breakdowns of the Supplier's QC Program shall be cause for investigation and corrective action before recommencement of fabrication operations for the project. Corrective actions may include an increase in Supplier's QC testing and inspection frequencies; modification to Supplier's QC Program and procedures; re-training, removal, or replacement of Supplier's QC personnel; and other such actions that will restore the effectiveness of the Supplier's QC Program.

The Supplier shall meet all requirements in the applicable specifications and related Material Quality Program, except Supplier's QC personnel are not required to be certified when they are not part of the acceptance decision. Supplier's QC personnel will be independent of IQF personnel; receive documented training; and be knowledgeable in their duties, testing methods, and procedures.

The Supplier's fabrication plant laboratory and equipment shall be approved through the requirements established in the DB QAP. The Supplier shall furnish the laboratory, field office, and all applicable equipment listed in the TxDOT-established Material Quality Program and applicable DMS.

Equipment can be shared between the IQF and Supplier's QC personnel, but IQF personnel shall not perform duties on behalf of the Supplier's QC personnel.

3.2.4.2 IQF Requirements

The IQF will inspect, sample, test, and audit the Supplier's fabrication processes and products in accordance with the applicable specifications, Material Quality Program, DMS, and approved CQMP, when the IQF's results are used as part of the Acceptance Program. The IQF will verify that fabrication processes and products delivered to the project site conform to approved material submittals and specifications.

3.2.4.2.1 IQF Staff The IQF inspection, sampling, testing, and audit staff will be employed by the IQF and be under the direction of the IQFM to verify compliance with the Contract Documents.

The size of the IQF's staff will reflect the volume of activities necessary for acceptance of the Work in progress and will be maintained in accordance with the approved CQMP.

The IQF personnel shall have the required nationally recognized certifications applicable to the inspection and testing activities to be performed for the project and have documented training in the applicable inspection and testing procedures. The training and experience of the IQF staff will be comparable to the scope, complexity, and nature of the activity to be inspected and tested.

For specialty materials and products (e.g., segmental concrete, bearings, and pedestrian bridges), the IQF inspectors shall have the nationally recognized certifications applicable to the inspection or testing activities performed. Nationally recognized best practices for fabrication, testing, and inspection to be used on the project shall be submitted to TxDOT MTD for approval at its sole discretion (e.g., *Construction Practices Handbook for Concrete Segmental and Cable-Supported Bridge*).

3.2.4.2.2 IQF Facilities and Equipment The DB Contractor's IQF will use a laboratory meeting the requirements described in Section 4 – Independent Assurance Program for quality sampling and testing.

3.2.4.3 OV Requirements

TxDOT's OVF will perform OV inspection, sampling and testing, and audits throughout the duration of the Work to verify the DB Contractor's compliance with the approved CQMP in accordance with the applicable Quality Program, when OVF's results are used as part of the acceptance decision.

For steel members, the OVF does not have to perform non-destructive testing (NDT) verification provided the OVF witnesses the IQF properly performing the NDT. Radiographic film interpretation must be performed by the IQF and verified by the OVF for member acceptance. OVF personnel shall be certified in the applicable NDT methods.

3.2.4.3.1 OV Staff The OVF inspection, sampling, testing, and audit staff will have the same required nationally recognized certifications as the IQF staff. Approved TxDOT MTD personnel are not required to have the nationally recognized certifications.

3.2.4.3.2 OV Facilities TxDOT's OV laboratory will meet the requirements described in Section 4 – Independent Assurance Program.

3.2.5 Failing Results for Prefabricated Product

Products with any failing inspection or testing results must follow the applicable NCR process. The IQF and OVF are responsible for following the applicable NCR process and witnessing repairs when MTD is not performing the inspection services. The IQF and OVF are responsible for following the NCR process specific to the project when damaged product is repaired at the jobsite.

3.3 Sampling and Testing

This section provides FHWA and TxDOT's requirements for sampling, testing, and acceptance requirements to be used in the acceptance decision.

3.3.1 Sample Types and Uses

Sampling is either random or fixed, depending on whether the location was selected randomly (random) or a specific location was subjectively identified (fixed). Sampling is also either independent or dependent, based on whether the location was independently selected (independent) or was based on the location of another sample (dependent or split). The F- and t- tests described in Section 3.6.3.1 – Statistical Analysis are valid only when using random independent or random split samples.

Split samples may be used outside the statistical analysis for OV of contractor-performed IQF tests under TxDOT's Owner Verification Program. A comparison process for performing and analyzing split samples testing between the OVF and IQF is necessary during the initial implementation of the QAP. TxDOT will analyze these samples and discuss the results with the IQF to assure laboratory and technician test results compare favorably. When the acceptable tolerance limits in Appendix B – Split Sample Tolerance Limits are exceeded, corrective actions for either or both parties will be identified and corrective actions will be incorporated as appropriate. This process will help provide initial alignment of the TxDOT and IQF laboratories' testing procedures.

Split samples testing may also be performed throughout the life of the project as necessary to investigate non-validating material categories and verify or realign testing equipment and personnel.

The IQF and OVF will determine random sample locations using American Society for Testing and Materials (ASTM) D3665.

3.3.2 Notification

On a weekly basis, the DB Contractor will update and provide the IQF and TxDOT with a rolling three-week look-ahead schedule consistent with the current Project Baseline Schedule (PBS) and showing the anticipated start and finish of Work activities. The look ahead schedule will include fabrication activities and planned construction activities. Anticipated inspection activities, reviewed by third parties, and all associated hold points will be shown in the look-ahead schedules for each of the Work activities. The DB Contractor will also, on a daily basis, communicate changes to the scheduled Work for each current day to the IQF, the OVF, and TxDOT and will notify the IQF, OVF, and TxDOT when materials are ready for sampling and testing.

The Next Day Look-Ahead (NDLA) schedule shall be submitted by the DB Contractor to the IQF, the OVF, and TxDOT with timely updates during the day for any changes. For any update to the NDLA made during the same workday, the DB Contractor shall provide reasonable notification as agreed upon by the IQF and TxDOT, to allow sufficient time for the IQF and OVF to perform the required acceptance inspection, sampling, and testing for the day.

3.3.3 Quantities and Testing Frequency

The IQF will continuously track and record the quantities of materials incorporated into the Project. These quantities will be reported per Section 3.6.3.5 – Monthly Construction Certification. The IQF will generate this report monthly to ensure compliance with the DB Guide Schedule and submit it to TxDOT. TxDOT will use the report to verify compliance of the IQF and OV testing frequency.

The IQF will perform material sampling at locations and timing defined in the DB Guide Schedule. At minimum, material sampling and testing will be conducted at the frequency of sampling specified in

the DB Guide Schedule. This minimum testing frequency must be met with random independent or random split samples as defined in Section 3.3.1 – Sample Types and Uses. During the startup of new categories of Work and when there are any concerns regarding the quality of material, the IQF will conduct testing at a higher testing frequency as described in the preamble of the DB Guide Schedule.

While the testing of random independent or random split samples is required to meet the DB Guide Schedule requirements, the IQF will perform additional (fixed) tests when the quality of material is questionable at a location other than the randomly selected location. These fixed tests will constitute an acceptance test, and a failing result will be addressed in a similar manner to a failing random independent test. Fixed tests will not count toward meeting minimum IQF sampling and testing frequencies. If IQF personnel are unavailable or unwilling to perform additional fixed tests when material quality is questionable at a location other than their random location, the OVF should perform those fixed tests.

TxDOT, or its designee, will perform oversight inspection and material verification sampling or testing. To verify IQF test results, OV testing will be performed at a minimum frequency shown in Appendix D – OV Levels for Materials Testing Validation/Verification, subject to project-specific recommendations to be approved by TxDOT MTD and FHWA. Split sample testing defined in Appendix F does not replace or relieve the requirements found in Section 4 – Independent Assurance Program.

3.4 Risk-Based Inspection

The OVF will implement a risk-based process for Owner Verification Inspection (OVI) for use in the acceptance decision, similar to Appendix D – OV Levels for Materials Testing Validation/Verification. Risk-based inspection is a prioritizing and planning tool in which elements of Work are identified for inspection based on their associated risk of failure. This approach allows the OVF to maximize the effectiveness of its inspection resources to oversee the IQF by concentrating on those assets that pose the highest risk of failure. In general, the higher the residual risk for the performance of the material after the DB Contractor's maintenance obligations expire, the higher the level of monitoring and verification that should be performed by the OVF. The OVF will use the risk-based inspection process to report the IQF's specification compliance on installed items of Work. If the IQF's processes and procedures are not performed in accordance with the approved CQMP, the OVF will request an Opportunity for Improvement (OFI) (see Appendix A) and the IQF shall modify CQMP inspection procedures as needed.

Appendix N provides an example of recommended fields to include on the Inspection Report Form.

3.4.1 Defining Risks

In risk-based inspection, risk is determined as the product of the probability of failure and the consequences associated with a failure. Consequences include short- and long-term functional failures, reduced design life, reduced safety, increased maintenance cost, probability of failure, severability of failure, and ability to detect. In conjunction with TxDOT and FHWA, the OVF will develop and conduct an OVI risk assessment workshop in conjunction with an OV testing risk assessment workshop, to define project-specific risks and provide details classifying appropriate levels of monitoring and verification for each element of Work constructed, based on their risk profiles. This workshop should be conducted at least eight weeks before start of construction.

3.5 DB Contractor Independent Quality Firm Requirements

The DB Contractor's IQF shall ensure that the Work is delivered in accordance with the Contract Documents, ESOC plans, temporary work plans, RFC plans, approved working and shop drawings, and specifications, and ensure that all materials used on the project (permanent and temporary) meet all these requirements.

The DB Contractor's CQMP shall establish a systematic approach to define the processes, methods, procedures, and documentation for delivery of IQ on the Project. These methods and procedures should be based on the DB Guide Schedule or greater, and parts of the TxDOT *Construction Contract Administration Manual* that apply to design-build projects, and shall clearly define the authority and responsibility for the administration of the IQ portion of the CQMP. The CQMP will be ISO-9001-2015-compliant for quality systems, quality plans, and quality audits.

The DB Contractor's IQF will assign an on-site Independent Quality Firm Manager (IQFM), responsible for management of the quality aspect of the DB Contractor's CQMP, which may be used in TxDOT's acceptance decision if validated or verified by the OVF. The IQFM will be a licensed professional engineer in the State of Texas and will be an employee of the IQF. The IQFM will report jointly to the DB Contractor's management team and TxDOT. The IQFM will not report to any person or party directly responsible for design or construction Work and will not be involved in scheduling or production activities.

3.5.1 Authority of IQFM

The IQFM will review, approve, authorize, examine, interpret, and confirm any methods or procedures requiring the Engineer's review, approval, authorization, examination, interpretation, or confirmation, as designated in the TxDOT Standard Specifications and design-build specifications. The IQFM is considered the "Engineer," for the purpose of this document, when interpreting the TxDOT Standard Specifications and design-build specifications, Contract Documents, standards, and policies during construction; however, the IQFM is not considered the EOR. Acceptance decisions by the IQFM must be verified through the OV program or through the NCR process.

The IQFM will have the authority to stop Work.

3.5.2 IQF Staffing

The IQF inspection and materials sampling or testing staff will be employed by the IQF and be under the direction of the IQFM to verify compliance with the contract for any or all parts of the construction Work and the materials used by any member of the DB Contractor's group. If approved in writing in advance by TxDOT, qualified individuals who are employees of or retained by manufacturers, Vendors, or Suppliers may inspect certain portions of the Work.

The size of the IQF's staff will reflect the volume of activities necessary for acceptance of the Work in progress and will be maintained in accordance with the approved CQMP.

The IQF's staffing requirements will be updated as necessary throughout the term of the agreement to reflect changes in the actual construction schedule. The DB Contractor will ensure that adequate IQF

staff are available and that CQMP activities are undertaken in a manner consistent with the Project schedule and in a manner that will enable the DB Contractor to achieve the Substantial Completion and Final Acceptance deadlines.

3.5.3 IQF Training and Experience

IQF inspection and materials sampling or testing staff will be trained in the applicable inspection and material sampling and testing procedures. The IQF's staff will be experienced in highway inspection and materials testing. The training and experience of the IQF staff will be commensurate with the scope, complexity, and nature of the activity to be inspected and tested. IQF personnel qualifications will include appropriate TxDOT or State Highway Agency certification for testing and inspection, as well as appropriate nationally recognized certifications applicable to inspection or testing activities. IQF materials sampling or testing personnel must be qualified under the IA program described in Section 4 – Independent Assurance Program. Documentation of the training, certification, and experience will be maintained by the IQF and available for review and audit.

3.5.4 IQF Facilities and Equipment

The DB Contractor's IQF will use a laboratory meeting the requirements described in Section 4 – Independent Assurance Program for quality testing. Unless otherwise approved by TxDOT, the laboratory or field laboratory will be located on-site or within 10 miles of the Project.

3.5.5 CQMP Requirements

The DB Contractor's CQMP will clearly address, at minimum, how the DB Contractor's IQF staff will address the following requirements.

A. The ISO-9001-2015-compliant CQMP will include methods and procedures that clearly define the authority and responsibility for the administration of the DB Contractor's CQMP;
B. Procedures for inspecting, checking, and documenting the Work for acceptance. Inspection, examinations, and measurements will be performed for each operation of the Work to assure quality;
C. Procedures to ensure that the education, training, and certification of personnel performing CQMP activities are achieved and maintained and that all Work is performed in accordance with the approved designs, plans, and specifications;
D. Procedures to document and track the disposition of any identified non-conformance to the plans and specifications. These procedures will include a clearly defined process for communicating identified non-conformances to TxDOT and the DB Contractor;
E. Measures to ensure that purchased materials, equipment, and services conform to the Contract Documents, Governmental Approvals, applicable laws and rules, and Design Documents. These measures will include provisions for source evaluation and selection, objective evidence of quality furnished by Subcontractors and Suppliers, inspection at the manufacture or vendor source, and examination of products upon delivery;
F. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified, and adjusted at specified periods to maintain accuracy within industry standards. Malfunctioning equipment or equipment out of calibration shall be tagged and placed out of service until it is repaired or calibrated;

G. A comprehensive system of planned and periodic audits of DB Contractor's CQMP to determine adherence to and the effectiveness of the CQMP. Audits must be performed at least twice annually or more frequently as needed. IQF personnel will perform the audits in accordance with the written procedures or checklists. Audit results will be documented, reviewed, transmitted to TxDOT, and acted upon by the DB Contractor. Follow-up action, including re-audit of deficient areas following corrective action, will be taken where indicated;
H. The requirements and methods for controlling documents. The DB Contractor's document control system will be compatible with TxDOT's;
I. Inspection of all Work to verify and document that the Work has been constructed in conformance with the RFC documents, specifications, and approved working and shop drawings;
J. Procedures on how IQF materials sampling and testing will be performed, including the processes for random sampling, tracking materials samples, processing materials samples, reviewing and approving test records, and tracking compliance with materials testing frequency;
K. Procedures for addressing failed tests. For a failed random independent test, a fixed test at the original failing test location and a new random independent test at a new location in the same lot are required. For a failed fixed test, a new fixed test is required at the original failing test location;
L. Procedures for reviewing IQF test results for compliance with mutually agreed-upon processes and naming conventions to ensure data integrity for accurate statistical analyses. The IQF shall coordinate with the OVF to mutually agree upon Controlled Vocabulary Lists (CVLs) before the CVLs are implemented;
M. Procedures for auditing of QC and IQF records, documentation, procedures, and processes to verify compliance with the Contract Documents and approved CQMP;
N. Procedures for the review and verification that all Portland cement concrete, soil-lime treatment (stabilization or modification), soil-cement treatment, and HMA mix designs have been approved as required per Section 2.2.2 – CQMP Requirements, Item N., and that mix designs meet the plans and specifications for their intended use;
O. Procedures for ensuring IQF sampling and testing will be performed at the frequency stipulated in the DB Guide Schedule. The IQF shall submit a monthly report to TxDOT showing quantity of materials incorporated into the Project during that month, so that TxDOT can verify compliance with the DB Guide Schedule. These quantities shall be broken down by material application, specification item, grade, source/supplier, and material (e.g., mix ID, design depth, and source identification code) for appropriate material acceptance in each of these material categories. The number of tests required and performed for each material category in the prior sentence shall also be presented for each test method required for that material category to ensure the DB Guide Schedule of sampling and testing frequency is being met for that material category. The DB Guide Schedule of sampling and testing frequency shall be met for each material category (permanent and temporary) used on the project;
P. Procedures for ensuring IQF staff will provide oversight and perform audits of the QC inspection, materials sampling, and testing operations. The procedure shall also include the review and audit of required Buy America documentation compiled and submitted by the DB Contractor and the DB Contractor's survey documentation;

Q. Procedures for ensuring that pre-approved materials used on the project maintain their approved status on the MPL. Materials shall be sampled and tested in accordance with Section 3.1.1 – TxDOT-Performed Materials Acceptance. For testing to be performed by MTD, results will be available after 30 days from receipt of the sample at TxDOT MTD. Each project is limited to three samples in 30 days;

R. Procedures for sampling, testing, and inspection, in accordance with Section 3.2.2 – TxDOT MTD Does Not Perform the Services (MPL-Approved Plant) and Section 3.2.3 – TxDOT MTD Does Not Perform the Services (Non-MPL-Approved Plant), when MTD does not perform inspection, sampling, and testing services of off-site prefabricated product fabrication plants and any jobsite prestressed concrete girder plant. The procedure shall also address the following requirements for prefabricated product fabrication plants:

   a. Procedures for inspecting, sampling, testing, auditing, and documenting the Work for acceptance. Inspection shall be performed for each process of the Work to assure quality and conformance with the RFC documents, specifications, and approved shop drawings. The IQF shall perform inspection, sampling, testing, and audits throughout the Work. Follow-up actions must be taken, including re audit of deficient areas, after corrective actions are implemented;
   b. Procedures to document and track any identified non-conformance fabrication processes or products. These procedures will include a clearly defined process for communicating identified non-conformances to TxDOT and the DB Contractor;
   c. Procedures for reviewing the Supplier's NCRs per the applicable DMS for accuracy and completeness of content for submission to TxDOT;
   d. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified, and adjusted at specified periods to maintain accuracy within industry standards. Malfunctioning equipment or equipment out of calibration shall be tagged and placed out of service until it is repaired or calibrated; and
   e. Procedures for addressing the Supplier's or OVF's failing test results and non verification of the Supplier's QC or IQF testing results;

S. Procedures for addressing OV failing test results and non-validation or non verification of IQF test results;

T. Procedure for verifying traffic control setup and completion of hold point inspections before starting construction Work associated with traffic control and appropriate corrective actions to ensure compliance with the Traffic Control Plan (TCP) before allowing Work to proceed;

U. Procedure for verifying that traffic control devices are in good working condition and appropriate corrective actions are taken to remedy traffic control device deficiencies. TxDOT Form 599, "Traffic Control Devices Inspection Checklist," shall be used when conducting the inspection. The IQF shall coordinate with the OVF to incorporate any OV traffic control inspections into a single Form 599. The IQF shall incorporate the IQF's and OVF's traffic-control-related findings into the single form. The IQF shall not maintain (save) or distribute electronic versions of the completed Form 599. Immediately upon completion of Form 599 by the IQF, file the form and related documentation separately from the project files in a folder boldly labeled "DO NOT DISCLOSE—EXCEPTED FROM DISCLOSURE BY 23 USC § 409." Maintain separation by filing the folder at the District, at the project office, or as designated by

District procedure. Destroy additional copies of the form. Include all paper copies of Form 599 required for day and night inspections each month in a "Barricade" folder. This file is considered safety information that federal law exempts from discovery, which makes it exempt from disclosure under the Public Information Act; and

V. Procedures for reviewing and certifying the construction portion of the monthly draw request.

3.5.6 Reporting, Record Keeping, and Documentation

The DB Contractor will document and maintain documentation showing how the IQF has complied with the CQMP requirements in Section 3.5.5 – CQMP Requirements.

The DB Contractor's IQF will maintain electronically and transmit to TxDOT daily inspection reports within 48 hours after the Work shift in a format acceptable to TxDOT. The daily inspection reports will document the day's events, activities, inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed. The responsible inspector and supervisor will sign the daily inspection reports.

The IQF will be responsible for establishing an electronic system for recording all materials test results. The responsible technician and his or her supervisor will sign the daily test reports and provide the results of the daily tests to TxDOT within 48 hours of test completion. The IQF's materials test results will be electronically transmitted to the TxDOT approved Electronic Content Management System (ECMS) software application (i.e., I2MS) in an Extensible Markup Language (XML) format acceptable to TxDOT. Guidance for TxDOT requirements for XML data transfer is provided in Appendix C – IQF Data Transfer Requirements. This electronic reporting is intended to allow the DB Contractor and TxDOT to make timely and accurate decisions regarding workmanship and materials quality issues.

If the IQF inspection and testing source documents are paper and then changed to an electronic document for project-level use, the original source paper document must be kept for three years after FHWA final voucher on the project and as detailed in the State of Texas Records Retention Schedule. The IQF inspection and materials test results will be simultaneously transmitted to TxDOT and the DB Contractor. The DB Contractor will not receive the IQF inspection or materials test results before TxDOT. Appendix N provides an example of recommended fields to include on the Inspection Report Form.

3.6 Owner Verification Requirements

3.6.1 General

TxDOT has ultimate responsibility for verifying that the Project is delivered in compliance with the Contract Documents. As such, TxDOT will perform OV sampling, testing, and inspection, and conduct audits to verify the DB Contractor's compliance with the approved CQMP.

TxDOT will establish a system for managing the materials acceptance process. This process will include the performance and approval of OV tests at the stipulated test frequency, review of IQF test results, performance of statistical analysis on OV and IQF test results, and any associated tasks arising from the statistical analysis.

TxDOT's OV laboratory will meet the requirements described in Section 4 – Independent Assurance Program.

3.6.2 Owner Verification Testing and Inspection Plan

TxDOT or its designated agent will develop a comprehensive risk-based OVTIP. The OVTIP shall be approved before construction starts. The OVTIP will clearly address, at minimum, how TxDOT's OV staff will address the following requirements.

A. Methods and procedures that clearly define the authority and responsibility for the administration of the OVTIP;
B. Procedures for overseeing and inspecting the Work for compliance with the DB Contractor's CQMP for each operation;
C. Procedures to ensure that the education, training, and certification of personnel performing OV activities are achieved and maintained and that all Work is performed in accordance with the approved OVTIP;
D. Procedures to oversee the status and disposition of any identified non-compliance with the plans and specifications;
E. Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified, and adjusted at specified periods to maintain accuracy within industry standards;
F. A system of planned and periodic audits of the DB Contractor's CQMP to determine adherence to and effectiveness of the CQMP. Audits must be performed at least annually or more frequently as needed. Audit results will be documented, reviewed, and sent to TxDOT and the DB Contractor. Follow-up action, including re-audit of deficient areas following corrective action, will be taken where indicated;
G. A system of planned and periodic audits of the OVF to determine adherence to and effectiveness of the OVTIP. Audit results will be documented, reviewed, and sent to TxDOT. Follow-up action, including re-audit of deficient areas following corrective action, will be taken where indicated;
H. Procedures for performing periodic risk-based inspection of Work to verify that the IQF has performed the Work in compliance with the ESOC plans, temporary work plans, RFC plans, specifications, and approved working and shop drawings. The procedure should identify a target oversight inspection rate and methods for performing verification inspections for all QC and IQF inspectors;
I. Procedures for how OV materials sampling and testing will be performed, including the processes for random sampling, tracking materials samples, processing materials samples, review and approval of test records, and tracking compliance with materials testing frequency;
J. Procedures for reviewing IQF and OV test results for compliance with mutually agreed-upon processes and naming conventions to ensure data integrity for accurate statistical analyses;
K. Procedures for ensuring that only tests performed by qualified IQF testing personnel are submitted to TxDOT;
L. Procedures for auditing QC and IQF records, documentation, procedures, and processes to verify compliance with the Contract Documents and approved CQMP. The procedures should

include review and audit of required Buy America documentation compiled and submitted by the DB Contractor;

M. Procedures to verify that Portland cement concrete, soil-lime treatment (stabilization or modification), soil-cement treatment, and HMA mix designs are reviewed and approved per the approved CQMP before use;

N. Procedures for ensuring OV testing will be performed at the frequency stipulated in this DB QAP;

O. Procedures for performing timely statistical analyses in compliance with procedures outlined in this DB QAP and reviewing and communicating the analytical results with QC and IQF personnel at least weekly;

P. Procedures for review and approval of NCR resolutions proposed by the DB Contractor;

Q. Procedures for verifying that the IQF is performing the required traffic control device inspections per the approved CQMP and that traffic control implementation is consistent with the temporary work plans, ESOC plans, and RFC plans. The procedures should also include OVF coordination with the IQF for traffic control inspections and review and verification that Form 599 was completed by the IQF and includes the IQF's and OVF's traffic-control-related findings; and

R. Procedures for sampling, testing, and inspection, in accordance with Section 3.2.2 – TxDOT MTD Does Not Perform the Services (MPL-Approved Plant) and Section 3.2.3 – TxDOT MTD Does Not Perform the Services (Non-MPL-Approved Plant), when MTD does not perform inspection, sampling, and testing of off-site prefabricated product fabrication plants and any jobsite prestressed concrete girder plant. The procedures shall address the following requirements for prefabricated product fabrication plants:

   a. A system of planned and periodic inspections, sampling, testing, auditing, and reviewing of the DB Contractor's CQMP to determine adherence to and effectiveness of the CQMP when following Section 3.2.2 – TxDOT MTD Does Not Perform the Services (MPL-Approved Plant). Follow-up actions must be taken in a timely manner, including re-audit of deficient areas, after corrective actions are implemented;

   b. Procedures for inspecting, sampling, testing, auditing, reviewing, documenting, and certifying the Work when following Section 3.2.3 – TxDOT MTD Does Not Perform the Services (Non-MPL-Approved Plant). Inspection will be performed for each process of the Work to assure quality and conformance with the RFC documents, specifications, and approved shop drawings. The OVF will perform inspections, tests, audits, and reviews throughout the work. Follow-up actions must be taken in a timely manner, including re-audit of deficient areas, after corrective actions are implemented;

   c. Procedures for investigating product represented by non-verified Supplier's QC and IQF testing results, including in TxDOT's acceptance decision; and

   d. Procedures for review and approval of NCR resolutions proposed by the DB Contractor.

3.6.3 Reporting, Record Keeping, and Documentation

TxDOT will submit OV Reports quarterly to FHWA for concurrence of TxDOT's compliance with the approved DB QAP. The reporting period for specific pay items or materials depends on the pace of construction and the number of tests performed in each analysis category, the time period of the sampling, and the specification and quality requirements. Each report will cover a period of

construction no greater than three months. The first and last reports may cover a period of construction greater than three months with prior approval by TxDOT MTD.

If the OVF inspection and testing source documents are paper and then changed to an electronic document for project-level use, the original source paper document must be kept for three years after FHWA final voucher on the project and as detailed in the State of Texas Records Retention Schedule.

The OV Report will be submitted quarterly and address the following areas.

A. Statistical analysis results, including specification requirements (when analysis categories are not validating) and status of validation process during startup and completion of an item;
B. Non-validation and non-verification investigations, including TxDOT's materials acceptance decision for materials represented by non-validated or non-verified IQF test results;
C. Split-sample test results;
D. Non-Conformance Report Log;
E. IQF EJ log;
F. OVF EJ log;
G. IQF's monthly certification (see template in Appendix G); and
H. Project-specific levels of analysis.

3.6.3.1 Statistical Analysis

For Level 1, F-tests and t-tests will be used to analyze OVF and IQF data. The F-test is a comparison of variances to determine whether the OVF and IQF population variances are equal. The t-test is a comparison of means to determine whether the OVF and IQF population means are equal. In addition to these two types of analyses, Level 2 independent verification and Level 3 observation verification will also be used to verify the IQF test results. The type of analysis and recommended level of significance for specific tests are shown in Appendix D – OV Levels for Materials Testing Validation/Verification.

Before performing any statistical analyses, it is important to ensure that the data contained in each analysis category are in reasonable compliance with the underlying assumptions of the F-test and t-test. The implementation of CVLs is essential to parse data into appropriate analysis categories.

3.6.3.2 Non-Verification Investigation

If the OVF test results do not validate (Level 1) or verify (Level 2) the IQF test results, an investigation will be conducted to determine the reason for non-verification. Assuming that the analysis categories were established appropriately, other areas for investigation include data integrity and accuracy, technician reporting issues, testing equipment and procedures, sampling variability, and material variability. Material quality when non-verification occurs is further discussed in Section 3.7 – Resolution of Differences in Materials Test Results. Results of the investigation should be reported for the non-verifying categories. If recurring non-verification continues, OV sampling and testing frequency must be increased to approach the minimum DB Guide Schedule testing frequency so there are enough OVF data for assessing material quality during the period of non-verification.

3.6.3.3 Engineering Judgment

Materials test results or other characteristics of the Work that indicate reasonable conformance with specification requirements, but did not meet the minimum specification requirements, may be adequate for their intended use. As such, TxDOT has allowed the IQF to exercise EJ to accept such materials or Work; however, each occurrence shall include notification to TxDOT within 24 hours and be properly documented in the EJ Log and submitted to TxDOT monthly. Appendix L provides the required minimum fields to be included on the IQF EJ Log. EJ decisions shall be made as soon as test results are available and the EJ Log updated within one week. Documentation will include the location where the material is incorporated; the specification requirement; the recorded test value; deviation from specification; and the EJ applied to allow use of that material, method, or product. If the IQF does not choose to exercise EJ to accept failing materials or Construction Deficiency noted in CDRs, the Nonconforming Items in question may still be accepted through the NCR process and repaired if approved, brought into conformance with specifications, or removed from the project.

The OVF will also maintain an EJ Log and documentation for any OV test result that fails to meet the minimum specification requirements and remains in place. Appendix L provides the required minimum fields to be included on the OVF EJ Log.

A project-specific EJ Agreement must be drafted by the IQFM in conjunction with the DB Contractor's EORs, and approved by TxDOT following the guiding principles below.

TxDOT, OVF, EOR, QC, and IQF personnel will meet and discuss situations that may arise in the field during construction under the specification items anticipated to be used on the project. They will agree on whether the IQF will be allowed to use EJ in each situation and how much latitude could be applied under what circumstances. Once agreed, each situation and its guidelines will be listed in the EJ Agreement. TxDOT will transmit a finalized project specific EJ Agreement listing situations where judgment may or may not be used. This is a living document and may be changed anytime as new special specifications, special provisions, or plans are developed; as situations change in the field; or at the discretion of TxDOT. All changes will be made in writing, clearly modifying the agreement. An example EJ Agreement is shown in Appendix K. It is only an example of some typical items that might be delegated, for reference and use in developing the agreement that will apply to the Project.

The development of the Project must proceed with a reasonable approach to the quality duties of the IQF and the extension of the IQF's ability to render decisions in the field with regard to the Work performed. TxDOT recognizes that the IQF is an element of the DB Contractor's team working to progress the development of the Project for TxDOT, and working alongside the DB Contractor, which is responsible for compliance. TxDOT recognizes that the IQF should be afforded the opportunity, in concert with its independent role, to render engineering decisions with respect to appropriate documents for inspection and testing, as long as the following conditions are met:

A. Engineering decisions will be delegated no lower than an engineer in charge of a section of the Project. This engineer may be an employee of TxDOT, the OVF, or the IQF, and must be a licensed professional engineer in the State of Texas. Engineering decisions will be within an individual's area of expertise;

B. EJ to accept material or Work failing specifications will never be applied solely to promote "partnering" or to help the DB Contractor. The Project's quality will be regarded as the highest order of concern. Schedule is a secondary consideration with respect to quality delivery of the Project;

C. If these guiding principles do not address the situation, the individual applying EJ must provide a decision to TxDOT regarding whether a material failing to meet specification requirements and not within applicable tolerances should be accepted, based on sound engineering principles, experience, or related results of applicable material tests;

D. EJ to accept materials or Work failing specification requirements will be applied only in cases where natural resources that will otherwise meet the intent of the design (e.g., strength tests vs. slump requirements) may be lost; rejection of material endangers quality or loss of a larger or more significant item (e.g., by rejecting load of concrete, a structure element subject to a cold joint, or reflective cracking); or another issue unduly threatens the overall quality or schedule of the Project. In general, EJ is typically allowed on factors that are only indicators of final product quality, such as slump, or are "rules of thumb" as written into specifications, such as the number of mixing revolutions or time to discharge since batching. Use of judgment supported by logical engineering analysis of the actual situation or conditions can allow production to continue. Materials that failed to meet the specification requirement may continue to be used if adjustments are made by the contractor to correct the cause of the failing factor. (Concrete failing slump, mixing time, or over-revolutions may still produce concrete exceeding design strength. For example, strength samples should be taken for concrete as fixed independent tests in these situations to verify the ultimate strength of the load of concrete.);

E. EJ should not be used by the IQF on material test results that are the ultimate acceptance criteria for the item, such as concrete compressive strength, density of HMA, pavement thickness, deck thickness, or cover on steel. These are generally not field situations that can be adjusted to correct during ongoing production or are immediately necessary to sustain production. They are factors that ultimately determine whether the product meets contract and design requirements and affect performance, durability, and maintenance. Accepting failing tests in these areas should be through the NCR process only after analysis and consideration by the EOR and TxDOT and may include assessment of liquidated damages;

F. Failed results of material tests may be accepted only for individual tests. Patterns of failure will not be accepted, will be considered a breakdown in QC activities, and will be addressed in the CQMP. Recurring use of EJ for the same plan or specification deviation should result in process corrections to the construction operations to assure material and Work are conforming to plan and specification requirements. In general, if failing tests are 5% or less and the process is consistent, then that process is generally under control. If failing tests rise to 8% or more, then increased process control testing and process adjustments are indicated as needed to return to a uniform controlled process. The intent of delegating EJ authority to the IQF is not to allow widening of a specification requirement on a continuing basis, but is necessary to allow for reasonable production efforts to adjust and control processes by the DB Contractor;

G. The IQFM may use EJ to direct that an amount of acceptance testing greater than the required minimum be performed when deemed necessary. The IQFM must document any variations from the prescribed frequencies;

H. The individual making the EJ will apply good engineering practices to ensure quality of accepted material by making additional tests (e.g., through engineering analysis) and will document his or her acceptance and justification;
I. EJ in acceptance of material or Work not meeting specification requirements will be applied only to situations that are technically sound, in consideration of localized conditions. EJ will not be used to waive specifications for conditions that have projectwide implications. The acceptance of materials or Work not meeting specifications in one instance at a location will not become a corridorwide or projectwide decision. Each situation will be judged on the merits of its unique characteristics;
J. TxDOT may, at any time, remove EJ authority from the IQFM in specific circumstances;
K. TxDOT and FHWA have oversight agreements in place that require specific documentation relating to non-conforming material that is allowed to remain in place. Any application of these guiding principles will be accompanied by appropriate documentation;
L. The IQF is encouraged, but not required, to consult with TxDOT before making acceptance decisions;
M. IQF personnel are not placed, and do not appear to be placed, in a position that exhibits signs that they were pressured by the DB Contractor to accept, approve, or continue the duties of the IQF scope of work as detailed in the Project under duress; and
N. Excessive use of EJ in any specific area, as determined by the IQF or TxDOT, will require a CAR by the DB Contractor that will include a root cause analysis for the repeated non-compliance with the specification requirement and actions to eliminate or significantly reduce the use of EJ in that area. Anyone in the project can initiate a CAR.

3.6.3.4 Non-Conformance and Construction Deficiency Logs

Materials or workmanship non-conformances that do not meet the minimum specification requirements may be adequate for their intended use; however, the incorporation of the material or workmanship in question is subject to the review and approval by the EOR and must be documented through the NCR process. Workmanship deficiencies that do not require an engineering decision by the EOR can be addressed through re-work using the CDR process. CDRs can be used for Work features that can be re-worked in the field to comply with the original requirements, but shall not be used to address and accept materials with failing testing results. CDR examples include re-working earthwork and re tying steel. Construction deficiencies must be noted in the daily inspection report.

The DB Contractor will identify, document, track, and report to TxDOT all instances of Work that have not been constructed with the strictest adherence to the approved drawings and specifications and within the requirements of the Contract Documents, the Governmental Approvals, and applicable Law. The reports for each NCR will be submitted simultaneously to TxDOT and the IQF in writing within 24 hours of the DB Contractor's knowledge of the same. As directed by TxDOT, the DB Contractor will adhere to the NCR and CDR flowchart process reflected in Appendix O and will track the duration of time for each step of the NCR resolution process.

The NCR will clearly describe the element of Work that is non-conforming and the reason for the non-conformance. The EOR will evaluate the effect of the non-conformance on the performance, safety, durability, and effect of the long-term maintenance of the project and the specific element affected. If the EOR determines remedial actions are necessary, the proposed remedial action will be documented

and bear the stamp of the original responsible licensed professional engineer or the responsible licensed professional engineer from the same firm assigned to replace the original.

Any NCR resolution involving materials should be based on acceptance procedures in the ESOC plan, temporary Work plan, RFC plans and specifications, and random testing by IQF with OVF verification, using test methods qualified by IA and consistent with the IQF's CQMP and OVTIP. OV testing must be increased if the IQ testing is in non-verification status. NCR resolutions that do not use this approach will not be consistent with 23 CFR § 637B and may cause non-participation by FHWA. For NCR resolutions involving destructive testing, the EOR will determine frequency and location of IQF testing and the OVF will perform a level 2 independent verification of all IQF sampling and testing. Alternatively, the EOR will determine the testing location and the OVF will perform the testing.

The DB Contractor will maintain a log of all NCRs and CDRs and submit these logs to TxDOT and the IQF bi-weekly. Each NCR and CDR will be numbered sequentially and given a brief description, status, and expected date for closure. The DB Contractor will track the actual duration for each step of the process for each initiated NCR/CDR as directed by TxDOT. All NCRs must be closed with the signature of the EOR or the qualified licensed professional engineer from the same firm if the EOR is not available, and TxDOT's approval. All NCRs that require changes to the original calculations or design must include the stamp of the EOR or the qualified licensed professional engineer from the same firm, and TxDOT approval. When TxDOT does not approve the NCR, resolution will be made in accordance with requirements of the Contract Documents, as applicable. Appendix M provides the required minimum fields to be included on the NCR log.

Excessive use of NCRs and CDRs in any specific area, as determined by the IQF or TxDOT, will require a CAR by the DB Contractor that will include a root cause analysis for the repeated non-compliance with the specification requirement and actions to eliminate or significantly reduce the cause of failing in that area. Anyone on the project can initiate a CAR.

3.6.3.5 Monthly Construction Certification

The DB Contractor will provide a monthly written certification by the IQFM, delivered to TxDOT with each payment request, indicating that the CQMP and all the measures and procedures provided therein are being fully complied with and are functioning properly. The IQF will maintain and submit monthly records that include factual evidence that required activities and tests have been performed, including the following:

A. Type, number, and results of CQMP activities, including reviews, inspections, tests, audits, monitoring of Work performance, and materials analysis;
B. Quantities of materials incorporated into the project;
C. Inspector or data recorder, the type of test or observation employed, the results and the acceptability of the Work, and action taken in connection with deficiencies;
D. Non-conforming Work and Construction Deficiency logs that identify the causes for rejection and show how long the NCRs and CDRs have been open;
E. Proposed corrective action for Non-conforming Work and Construction Deficiency Items;
F. Corrective actions taken with respect to Nonconforming Work and Construction Deficiency Items; and

G. Results of such corrective actions.

3.6.3.6 End-of-Project Materials Certification Letter

For projects with federal oversight, the end-of-project Materials Certification Letter (MCL) will be signed by the District Engineer or designee. The end-of-project MCL, along with all approved OV reports attached as supporting documentation, will be the final materials certification to be submitted to the FHWA Division Administrator for each construction project before FHWA closes out the Project. Refer to 23 CFR § 637, Subpart B, Appendix A, for an example of an MCL.

For projects without federal oversight, the end-of-project materials certification, signed by the District Engineer or designee, along with all approved OV reports, will be the final materials certification and will be kept at the District office. A copy of the end-of-project MCL, signed by District Engineer or designee, will be submitted to MTD before TxDOT closes out the Project.

3.7 Resolution of Differences in Materials Test Results

Throughout the Project, there may be differences in individual materials test results or test result sample populations between the IQF and TxDOT. Due to the natural variability in construction materials testing and unavoidable biases in sampling and testing, these differences are often difficult to avoid. When the differences between IQF and TxDOT sample populations are large enough, TxDOT's OV sampling and testing will not verify IQF test results. IQF test results that are not verified will not be used for TxDOT's acceptance of the material.

All failing IQF and OVF test results, verifying or non-verifying, must be accepted based on EJ, undergo the NCR process, be re-worked, or be removed and replaced.

Any OV or IQF results identified as an outlier must be confirmed using ASTM E178. An outlier may be excluded from validation or verification analysis but cannot be used to address failing materials or excluded from Percent Within Limits (PWL) calculations.

3.7.1 Material Quality

Material quality addresses whether the material in question meets its intended purpose. If test results indicate that the specification requirements are met, the material is deemed to have met its intended purpose. If test results do not indicate that specification requirements are met, but the test results are within reasonable conformance to the specification requirements, EJ may be exercised to determine that the material met its intended purpose in accordance with Section 3.6.3.3 – Engineering Judgment.

A material quality decision must be made on all IQ and OV test results regardless of whether the analysis category for that material is validating. If the material in question is in an analysis category that is validating, the OV performs its regular program-level oversight of IQF and its EJ decisions. If the material in question is in an analysis category that is non validating, TxDOT must provide engineering justification for acceptance of the material in question and only OV results are used to make the acceptance decision because IQ results may not be used in the acceptance decision.

3.7.2 Validating Materials

When either the IQF or OVF test results fail to meet specification requirements, and if these materials have been historically validating, there are four possible combinations of passing or failing results between the IQF and the OVF that must be evaluated.

3.7.2.1 IQF and OV Test Results Pass Specification Limits

Material may be left in place.

3.7.2.2 IQF Test Results Fail and OV Test Results Pass Specification Limits

Material may be left in place if the IQF exercises EJ, as described in Section 3.6.3.3 – Engineering Judgment, to accept the material, or if the material is accepted through the NCR process.

3.7.2.3 IQF and OV Test Results Fail Specification Limits

Material may be left in place if the IQF and OVF determine that EJ may be used to accept the material for their respective tests or if the material is accepted through the NCR process, unless re-worked or replaced. Otherwise, the acceptance of material is subject to one of the two scenarios below:

A. If the OVF exercises EJ to accept the material based on the OV test result, but the IQF does not exercise EJ to accept the material based on the IQF test result, then the DB Contractor shall address this material that does not meet its intended purpose through the NCR process, unless re-worked or replaced; or
B. If the IQF exercises EJ to accept the material based on the IQF test result, but TxDOT or the OVF does not immediately exercise EJ to accept the material based on the OV test result, the IQF will perform a fixed split test at the OV failing test location to assist with the investigation:
    a. If the IQF fixed split tests do not meet specifications and the IQF does not exercise EJ to accept the material, the DB Contractor shall address this material that does not meet its intended purpose by the NCR process, unless re-worked or replaced; and
    b. If the IQF fixed split test meets specifications or the IQF exercises EJ on the IQF fixed split test that does not meet specifications, TxDOT will further investigate the area in question. This investigation may include additional fixed tests performed by the OVF. Based on the results of the investigation, TxDOT will decide to accept the material in question using EJ, or to accept the material with the DB Contractor addressing the failing material that does not meet its intended purpose through the NCR process, unless re-worked or replaced.

3.7.2.4 IQF Test Results Pass but OV Test Results Fail Specification Limits

Material may be left in place if the OVF exercises EJ to accept the material or if the material is accepted through the NCR process. This is subject to TxDOT response in the two scenarios below:

A. OV test results indicate reasonable conformance with specification requirements, and TxDOT exercises EJ to accept the material; and
B. OV test results do not indicate reasonable conformance with specification requirements, and the IQF will perform a fixed split test at the failing OV test location:
    a. If the IQF fixed split tests do not meet specifications and the IQF does not exercise EJ to accept the material, the DB Contractor shall address this material that does not meet its intended purpose through the NCR process, unless re-worked or replaced; and

b. If the IQF fixed split test meets specifications or the IQF exercises EJ on the IQF fixed split test that does not meet specifications, TxDOT will further investigate the area in question. This investigation may include additional fixed tests performed by the OVF. Based on the results of the investigation, TxDOT will decide whether to accept the material as meeting its intended purpose via EJ. If TxDOT decides to not accept the material, the DB Contractor will have to address it through the NCR process, unless reworked or replaced.

3.7.3 Non-Validating Materials

When OV independent test results do not statistically validate the IQF test results as outlined in Section 3.6.3.1 – Statistical Analysis (Level 1), or TxDOT determines that independent OV sampling and testing do not verify IQF test results (Level 2), TxDOT and the IQF will jointly investigate to determine the sources of non-validation or non-verification.

TxDOT will work with the IQF and DB Contractor to immediately determine whether the material represented by the non-validation will remain in place, will be reworked, or will be removed and replaced.

If material is to remain incorporated into the Project, the material in question will be evaluated using the process described Section 3.7.3 – Non-Validating Materials. There are four possible combinations of passing and failing results between the IQF and OVF test results. In the four cases below, the non-validation shall be investigated.

3.7.3.1 IQF and OV Test Results Pass Specification Limits

Although statistical validation has not occurred, the IQF and OVF test results are passing the established specification limits. Thus, material may be left in place.

3.7.3.2 IQF Test Results Fail and OV Test Results Pass Specification Limits

Material may be left in place if the IQF exercises EJ, as described in Section 3.6.3.3 – Engineering Judgment, to accept the material, and TxDOT's concurrence will be required because the material is in non-validation status or is accepted through the NCR process.

3.7.3.3 IQF and OV Test Results Fail Specification Limits

Material may be left in place if the IQF and OVF determine that EJ may be used to accept the material and TxDOT concurs with the IQF's EJ to accept the material in question or the material is accepted through the NCR process, unless reworked or replaced. Otherwise, the acceptance of material is subject to one of the two scenarios below:

A. If the OVF exercises EJ to accept the material based on the OV test result but the IQF does not exercise EJ to accept the material based on the IQF test result, the DB Contractor will have to address this material that does not meet its intended purpose through the NCR process, unless reworked or replaced; or
B. If the IQF exercises EJ to accept the material based on the IQF test result but the OVF does not immediately exercise EJ to accept the material based on the OV test result, the IQF will perform a fixed split test at the OV failing test location to assist with the investigation:

a. If the IQF fixed split test does not meet specifications and the IQF does not exercise EJ to accept the material, the DB Contractor will have to address this material that does not meet its intended purpose by the NCR process, unless reworked or replaced; and
b. If the IQF fixed split test meets specifications or the IQF exercises EJ on the IQF fixed split test that does not meet specifications, TxDOT will further investigate the area in question. This investigation may include additional fixed tests performed by the OVF. Based on the results of the investigation, TxDOT will decide whether to accept the material in question by EJ. If TxDOT decides to not accept the material, the DB Contractor shall address the failing material that does not meet its intended purpose through the NCR process, unless reworked or replaced.

3.7.3.4 IQF Test Results Pass but OV Test Results Fail Specification Limits

Material may be left in place if TxDOT determines that EJ may be used to accept the material or if the material is accepted through the NCR process. This is subject to TxDOT response in the two scenarios below:

A. OV test results indicate reasonable conformance with specification requirements, and TxDOT exercises EJ to accept the material; and
B. OV test results do not indicate reasonable conformance with specification requirements, and the IQF will perform a fixed split test at the failing OV test location:
   a. If the IQF fixed split test does not meet specifications and the IQF does not exercise EJ to accept the material, the DB Contractor will have to address this material that does not meet its intended purpose through the NCR process, unless reworked or replaced; and
   b. If the IQF fixed split test meets specifications or the IQF exercises EJ on the IQF fixed split test that does not meet specifications, TxDOT will further investigate the area in question. This investigation may include additional fixed tests performed by the OVF. Based on the results of the investigation, TxDOT will decide whether to accept the material as meeting its intended purpose by EJ. If TxDOT decides to not accept the material, the DB Contractor will have to address this material that does not meet its intended purpose through the NCR process, unless reworked or replaced.

3.7.4 Re-Testing after Reworking Material

If material is reworked, the IQF shall perform fixed tests at the locations of the original failing tests and new random independent tests with OV verification to accept the material in question. Test results on the material in question before the rework are excluded from any verification analyses.

3.7.5 Non-Verifying Analysis Runs and Analysis Categories

When OV test results do not statistically validate the IQF test results as outlined in Section 3.6.3.1 – Statistical Analysis (Level 1), or TxDOT determines that independent OV sampling and testing do not verify IQF test results (Level 2), TxDOT and the IQF will jointly investigate to determine the sources of non-validation/non-verification. TxDOT and the IQF will adjust sampling and testing processes to correct any sampling and testing deficiencies, align testing procedures, calibrate equipment, and reduce testing bias as identified during the joint investigation. TxDOT may increase the OV sampling and testing frequency to provide additional OV data for potential continuing non-validation analyses.

If the non-validation persists (five or more consecutive non-validation analysis runs on either the F-test or the t-test), a process NCR will be issued to formally document and seek resolution of the non-validation. This process NCR can only be closed out by TxDOT when the non-validation analysis category is brought back into validation on both the F-test and the t test for two or more consecutive times, and based on the results of the investigation.

If non-validation continues, TxDOT shall increase the OV sampling and testing frequency (close to minimum DB Guide Schedule testing frequency) to provide additional OV data to help in the non-validation investigation and to provide additional test results to use in the acceptance decision.

3.7.5.1 Level 1 – Continuous Analysis

Level 1 verification is performed using continuous F- and t-tests at a predetermined level of significance (α) shown in Appendix D. If either the F-test or the t-test is not validating for a given analysis run, that analysis run is considered non-validating. An individual non validating analysis run does not make the analysis category non-validating for that reporting period. The following criteria are used to determine whether a Level 1 analysis category is validating or non-validating for the quarterly OV report:

A. Analysis categories that have at most three OV test results in the reporting period with very small standard deviations that lead to statistically significant but not practically significant differences are not reported as non-validating;
B. Analysis runs that trigger the "no test left behind" rule and have greater than 25 OV test results are not considered non-validating runs because of large OV sample size and the effect it has on the F- and t-test; and
C. It is natural for some analysis runs to be non-validating occasionally. Therefore, an analysis category is considered non-validating for a given quarter and the non validation investigation is presented in the OV report if the level of non-validation meets the criteria below:
    a. One or more non-validating analysis runs when there are five or fewer analysis runs in the quarter;
    b. Two or more non-validating analysis runs when there are between six and 20 analysis runs in the quarter;
    c. Three or more non-validating analysis runs when there are between 21 and 40 analysis runs in a quarter; or
    d. Four or more non-validating analysis runs when there are more than 40 analysis runs in the quarter.

3.7.5.2 Level 2 – Independent Verification

If Level 2 does not verify, TxDOT will investigate the analysis categories that are not verifying and present the results of the non-verification investigation in a manner like that for Level 1.

3.7.5.3 Level 3 – Observation Verification

If Level 3 observation does not find that the test is performed satisfactorily, the test performed is invalid and a re-test is needed. If the cause for the unsatisfactory test is the technician's performance of the test procedure, the technician will be re-trained and a follow-up observation performed. If the

cause for the unsatisfactory test is related to the equipment, the equipment will be taken out of service until it is repaired or replaced and a follow-up observation is performed.

3.7.6 Referee Testing

Referee testing is only between the OVF and IQF. Resolution of discrepancies over specific test results can be achieved in a reliable, unbiased manner by referee testing and evaluation performed by a referee laboratory. The referee laboratory will be the TxDOT MTD central laboratory or designee and an independent third-party testing laboratory qualified according to Section 4 – Independent Assurance Program. TxDOT's designee referee laboratory must be approved by TxDOT MTD. Referee testing is solely a TxDOT function; therefore, the third-party laboratory cannot be hired by the DB Contractor. The decision by the referee laboratory will be final. Referee test results will be signed and sealed by a licensed professional engineer registered in the State of Texas. The TxDOT project manager (PM) shall contact and coordinate with MTD before submitting referee samples and TxDOT Form 202 (used for design-build projects) to the MTD central laboratory. The TxDOT PM will ensure Form 202 is completed and contains the required project information when submitting the referee samples. MTD will report referee results to the TxDOT PM.

4 Independent Assurance Program

4.1 General

TxDOT, or its designee, will implement the IA Program. This IA Program evaluates all sampling and testing procedures, personnel, and equipment used as part of an acceptance decision. The IA Program evaluates the qualified sampling and testing personnel and testing equipment and is established using the system approach. The system approach bases frequency of IA activities on time, regardless of the number of tests, quantities of materials, or numbers of projects tested by the individual being evaluated.

This program provides uniform statewide procedures to ensure that tests are performed by qualified personnel and that laboratory facilities and equipment are adequate to perform the required sampling and testing methods.

The frequencies and activities shown in Table 1 are required for evaluating sampling and testing personnel and equipment under the system approach to IA.

Table 1: Frequencies and Activities Required Under IA System Approach.

Time	Activity
Before performing acceptance sampling and testing.	Qualification is required under Section 4.3 – Personnel Qualifications and Section 4.4 – Laboratory Qualifications.
Within 12 months after observation and qualification, not to exceed 15 months.	Each qualified technician is required to participate in the first available proficiency test. However, in the event of military deployment or medical leave, a split sample may be collected for each test method requiring IA upon the technician's return to work. Results must compare to the IA test results in Appendix B, according to the established tolerance.
Within 24 months after observation and qualification, not to exceed 27 months.	Each qualified technician is required to participate in the first available proficiency test. However, in the event of technician military deployment or medical leave, a split sample may be collected for each test method requiring IA upon the technician's return to work. Results must compare to the IA test results in Appendix B, according to the established tolerance.
Within 36 months of qualification. (Required only for certifications issued by TxDOT or Texas Asphalt Pavement Association [TxAPA], which has a three-year certification cycle.)	Qualification is again required under Section 4.3 – Personnel Qualifications and Section 4.4 – Laboratory Qualifications.
Within 36 months after observation and qualification, not to exceed 39 months. (Required only for American Concrete Institute [ACI] certifications, which have a five-year certification cycle.)	Each qualified technician is required to participate in the first available proficiency test. However, in the event of military deployment or medical leave, a split sample may be collected for each test method requiring IA upon the technician's return to work. Results must compare to the IA test results in Appendix B, according to the established tolerance.

Time	Activity
Within 48 months after observation and qualification, not to exceed 51 months. (Required only for ACI, which has a five year certification cycle.)	Each qualified technician is required to participate in the first available proficiency test. However, in the event of military deployment or medical leave, a split sample may be collected for each test method requiring IA upon the technician's return to work. Results must compare to the IA test results in Appendix B, according to the established tolerance.
Within 60 months of qualification. (Required only for ACI, which has a five year certification cycle.)	Qualification is again required under Section 4.3 – Personnel Qualifications and Section 4.4 – Laboratory Qualifications.

Maintaining technician qualification under the IA system approach requires continuation of the above cycle of qualification and successful split or proficiency sample testing, as applicable. Failure to satisfactory complete annual split or proficiency testing will result in certification revocation.

4.2 Independent Assurance Quality Plan

TxDOT or its designated agent (the Independent Assurance Firm [IAF]) will develop an Independent Assurance Quality Plan (IAQP). The IA manager will complete and submit the project-specific IAQP to the TxDOT PM and MTD for review and comment. The IAQP must be approved by TxDOT MTD before construction starts. The IAQP will clearly address, at minimum, how IA staff will address methods and procedures that clearly define the administration of the IA program, including all requirements in Section 4 – Independent Assurance Program. The IAQP will be revised as needed and submitted to TxDOT MTD for approval. The administration of the IA Program must be performed by personnel approved by TxDOT MTD.

The programmatic IAQP template can be found at the following link: https://ftp.txdot.gov/pub/txdot/mtd/qap-iaqp-template.docx.

4.3 Personnel Qualifications

IA personnel must be qualified by TxDOT MTD or its qualified designee to issue certifications for the project. Personnel performing tests on the Project must be qualified in the appropriate test methods.

4.3.1 Required Certifications

Sampling and testing personnel must obtain and keep current the following certifications unless otherwise waived by governing specifications:

A. ACI Certification Programs:
   a. Concrete Field-Testing Technician—Grade I; and
   b. Concrete Strength Testing Technician;
B. Hot-Mix Asphalt Center (HMAC) Certification Levels:
   a. AGG101—Aggregate Specialists;
   b. Level 1A—HMA Plant Production Specialist;
   c. Level 1B—HMA Roadway Specialist;
   d. Level 2—HMA Mix Design Specialist;
   e. SB 101—Properties Specialist;

f. SB 102—Field Specialist;
g. SB 103—Materials Analysis Specialist;
h. SB 201—Strength Specialist; and
i. SB 202—Compressive Strength Specialist;

C. TxDOT Qualification—Concrete Mix Design Review/Approval:
   a. MTD202 (Non-TxDOT)—ClassMarker Concrete Mix Design Reviewer Course; and
   b. HCCMXDES14—ClassMarker—Hydraulic Cement Concrete Mix Design and Control Certification;
D. Any other project-specific test certifications as required per the specifications, applicable DMS, or material quality program (e.g., Post-Tension Institute Level II and American Segmental Bridge Institute).

Reciprocity may be granted to individuals who have been successfully qualified under another state's program. These situations will be considered on a case-by-case basis, and nationally recognized certifications must be submitted to TxDOT MTD for approval, at MTD's sole discretion, before the sampling and testing used for acceptance.

For those testing procedures not covered by the above ACI or HMAC certifications, the following personnel may qualify an individual to perform the required sampling and testing of materials:

A. Qualified IA laboratory personnel who have been authorized by TxDOT MTD to perform personnel qualifications; and
B. TxDOT MTD personnel.

For all other test procedures not covered by the above certification programs or authorized personnel, certification will be in accordance with the specifications, applicable material quality program, applicable DMS, and contract requirements.

4.3.2 Provisional Certifications

If the certifications listed in Section 4.3.1 – Required Certifications cannot be readily obtained because of course availability, schedule conflicts, or other extenuating circumstances, provisional certifications administered by the designated project IA laboratory will be allowed, per the following stipulations:

A. Provisional certifications must be approved by the TxDOT PM;
B. Provisional certifications will be valid for one month after the HMAC or ACI examination dates; and
C. The candidate must show evidence of being enrolled in the required ACI or HMAC certification course.

4.3.3 Qualification Procedure for IQF, OVF, and IA Personnel

Any individual who performs tests on materials for acceptance must be qualified to perform tests in the areas of hydraulic cement concrete, soils and aggregates, and bituminous materials.

Appendix E – Test Methods for Personnel Qualifications provides test methods for which individuals are to be qualified. There may be other tests required, based on project-specific specifications, that may require qualification.

Performance Test: An individual must successfully perform the specific test and the necessary calculations required to determine specification compliance in the presence of an authorized evaluator. Successful performance is defined as demonstrating the ability to properly perform the key elements for each test method. If the individual fails to demonstrate the ability to perform a test, the individual will be allowed one re-test per test method at the evaluator's convenience. The maximum number of attempts cannot exceed three trials in a 90-day period.

Written Test: An individual must also pass a written examination (minimum score of 80%) administered by an authorized evaluator. The maximum amount of time allocated per test will be 1 hour. If an individual cannot complete the written test in an hour, it will result in failure. An individual failing the written examination may request a re-test. The re-test must be scheduled and administered within 30 days of notification of failure; however, the maximum number of attempts cannot exceed three trials in a 90-day period.

Under unique circumstances, the qualification authority may grant a verbal examination upon request. The reasons for requesting a verbal examination must be presented and documented before the individual is allowed to take the examination. Should the technician fail the re-test examination, the technician will not be allowed to test again unless the IA manager receives a letter from the technician's employer stating that the technician has received additional training. Failure to pass the third written examination will be considered as failing the entire qualification.

Successful qualification is defined as passing the performance and written examinations.

In addition, for tests for which TxDOT MTD requires an annual split or proficiency sample evaluation, Appendix F – Test Methods for Split/Proficiency Evaluation provides a list of testing procedures. TxDOT MTD determines the qualification authority for the split or proficiency sample. The individual must participate in proficiency sample testing given by the qualification authority to validate the qualification. If the individual performance ratings result in a rating of 2 or below, a Notice to Respond is required to maintain the certification in the pertinent proficiency program.

Split samples must be used only for medical leave or military exceptions. Split sample results will be evaluated against TxDOT's acceptable tolerance limits shown in Appendix B – Alignment/Split Sample Tolerance Limits. Split sample test results must be within the sample tolerance limits. If the comparisons of the test results do not comply with the tolerances, an engineering review of the test procedures and equipment will be performed immediately to determine the source of the discrepancy. Corrective actions must be identified and incorporated as appropriate before the individual performs additional testing on that test method.

Unless otherwise stated, qualification of an individual is valid for no more than three years (except for ACI, which has a five-year certification), after which the individual must be re qualified. Under the IA system approach, annual split or proficiency will be required as specified in *Table 1: Frequencies and Activities Required Under IA System Approach*.

4.3.4 Documentation

The IA laboratory manager is responsible for maintaining documentation of all individuals qualified under his or her authority who perform required tests for acceptance of materials. Documentation to be maintained includes:

A. Copies of qualification certificates issued by ACI and HMAC, which will be maintained and stored in TxDOT's Electronic Content Management System (ECMS) (e.g., I2MS) or in the statewide Construction Contract Management System (CCMS) (e.g., AASHTOWare Project Construction & Materials [APCM]) as applicable;
B. Copies of qualification certificates issued by TxDOT or the IA laboratory, with expiration dates, which will be maintained and stored in TxDOT's ECMS or CCMS as applicable;
C. A report showing the examinations for test procedures administered to each technician by TxDOT or the IA laboratory, with clear identification of technician's name, qualifier's name, score, date taken, and expiration date;
D. Original performance examinations saved as a PDF file for test procedures administered to each technician by the IA laboratory, with clear identification of technician's name, qualifier's name, qualification status, and date;
E. Results of annual proficiency testing administered by TxDOT or the IA laboratory for each technician; and
F. Technician acknowledgment of Form 2687, "Examinee's Certification Acknowledgment," for TxDOT- or IA-laboratory-issued certifications, which is retained within the ClassMarker written exam record. The purpose of this form (available at the TxDOT.gov Materials web page) is to confirm the examinee's acknowledgement regarding integrity and his or her rights and responsibilities when participating in remote or virtual certifications.

Supporting documentation must be retained for at least 10 years or as detailed in the State of Texas Records Retention Schedule, whichever is greater. Qualification authority must be shown on the certificate given to each individual.

4.3.5 Disqualification

Accusations of misconduct by testing technicians will be made to the responsible TxDOT representative. Table 2 defines the three levels of misconduct: neglect, abuse, and violations of ethical integrity.

Table 2: Levels of Misconduct.

Term	Definition
Neglect	Unintentional deviations from testing procedures or specifications.
Abuse	Careless or deliberate deviation from testing procedures or specifications.
Violations of ethical integrity	Breach of the trust placed in the certified technician or specialist, including, but not limited to: • Falsification of records; • Permitting misrepresentation of qualifications; • Awareness of improprieties in sampling, testing, or production by others and not reporting them to appropriate supervisors involved in the project;

Term	Definition
	• Re-sampling or retesting without awareness and consent of appropriate supervisors involved in the project; and • Manipulating compensation or production.

The Hot-Mix Certification Steering Committee (HMCSC), TxDOT, and the Concrete Certification Steering Committee (CCSC) (ACI-MTD) reserve the right to remove technicians for misconduct. Allegations of misconduct must be in writing by email to the MTD Quality Assurance (QA) manager, HMCSC, or CCSC and sent to MTD_Certification_Committee@txdot.gov. The allegations should contain the name, address, and signature of the individual making the allegation. All reported allegations will be reviewed and submitted to TxDOT's Compliance Division, which is responsible for conducting investigations.

The applicable committee will determine the appropriate action, and the accused and the individual making the allegation will be notified of the opportunity to appear before the committee for resolution of the allegation. Penalties could range from a reprimand to permanently revoking the technician's certification status in TxDOT's CCMS or ECMS. The co chairs or designated members will notify all involved parties, in writing, of the findings.

Technicians disagreeing with the findings and resolution may appeal the decision:

- Appeal requests for TxDOT- and ACI-MTD-issued certifications should be formally directed to the MTD Division Director (MTD-DD). The appeal process will be conducted by four MTD-DD-selected TxDOT employees who were not previously involved in reviewing the case. Results of the appeal will be binding and considered final; and
- Appeal requests for HMAC investigations should be formally directed to the HMAC co chairs for further processing. The appeal process will consist of a separate appeals committee comprising industry members (the "Appeal Committee"). The process may be escalated further by arbitration, and the results will be considered final and binding.

4.4 Laboratory Qualifications

Laboratories where IA, IQF, and OVF tests will be performed must be qualified. Appendix H provides the minimum qualification requirements for laboratories.

IQF and OVF project or field laboratories performing Tex-242-F and Tex-248-F tests must be a qualified laboratory from TxDOT's MPL.

4.4.1 Laboratory Qualification Responsibility

The TxDOT MTD central laboratory will be accredited by one of the following FHWA- and TxDOT-approved, AASHTO Accreditation Program (AAP) accrediting bodies:

A. AASHTO re:source and Cement and Concrete Reference Laboratory (CCRL);
B. Construction Materials Engineering Council (CMEC); or
C. Laboratory Accreditation Bureau (L-A-B).

TxDOT MTD is responsible for overseeing the statewide laboratory qualification program and for qualifying the IA laboratory. The IA laboratory is responsible for qualifying IQF and OV laboratories.

4.4.2 Laboratories to be Qualified

All laboratories performing testing for TxDOT require qualification. These include, but are not limited to, the following:

A. TxDOT MTD central laboratory;
B. TxDOT MTD field laboratories;
C. IAF laboratory;
D. Referee laboratory;
E. IQF laboratory; and
F. OVF laboratory.

4.4.3 Qualification Process

The laboratory qualifying authority will use Form 2681, "Quality System Inspection—Commercial Laboratory," to:

A. Identify the firm's location, contact information, and project role;
B. Identify the scope of testing to be performed;
C. Verify that manuals or test methods used to perform tests are available and updated;
D. Document that the laboratory has the required equipment to perform the tests using the Visual Inspection Equipment Checklist; and
E. Check the calibration or verification records for each piece of equipment, including:
    a. Description of equipment;
    b. Identification of any traceable standard used;
    c. Frequency of calibration;
    d. Date of last calibration;
    e. Date of next calibration;
    f. Calibrating technician;
    g. Detailed results of calibration;
    h. Procedure used to calibrate/verify equipment; and
    i. Procedure used to identify equipment not in compliance.

In addition, all equipment may be subject to calibration verification or other inspection by the qualifying authority.

The IA laboratory will issue a certificate of accreditation for each IQF and OVF project laboratory after performing the required laboratory qualifications. The certificate will include the laboratory name, address, and contact information, and the accredited test methods. The IA laboratory will submit the accreditation certificate along with Form 2681 and the Visual Inspection Equipment Checklist for each IQF and OVF laboratory to MTD_Qualified_Labs@txdot.gov. MTD will post the certificates to the directory of active accredited laboratories available at the MTD "Crossroads" intranet site.

In addition to submitting Form 2681 at the beginning of the project, the IA laboratory will perform an audit follow-up every 12 months (or more frequently as needed with prior approval by TxDOT) for the remaining duration of the project.

4.4.4 Independent Assurance Testing Equipment

TxDOT MTD will qualify IA laboratory testing equipment used for IA sampling and testing according to Section 4.4 – Laboratory Qualifications.

The IA laboratory will qualify all other IQF and OVF sampling and testing equipment and AASHTO re:source and CCRL -, CMEC-, or L-A-B-accredited commercial laboratory equipment used for IA sampling and testing. The IA laboratory will provide qualification only in the areas for which the IA laboratory is accredited. MTD or its designee will qualify IQF and OVF equipment if the IA laboratory is not able to perform the equipment qualification for testing outside its scope.

The qualifying authority will qualify testing equipment according to the following guidelines:

A. Frequency for qualifying IA sampling and testing equipment will not exceed one year;
B. Calibration or verification is required whenever the laboratory or equipment is moved; and
C. IA equipment will be other than that used for performing OV, IQ, or QC testing.

Any equipment used to perform OV and IQ sampling and testing in making an acceptance decision will be evaluated by IA sampling and testing personnel or by MTD's designee as needed. This evaluation includes calibration checks and split or proficiency sample tests. The IAF will document that the laboratory has the required equipment to perform the tests using the Visual Inspection Equipment Checklist. The requirements for and frequency of equipment calibrations are shown in TxDOT's test procedures, as referenced in Section 4.4.5 – Calibration Standards for Laboratory Equipment. Acceptable tolerance limits for the comparison of test results from split or proficiency samples are shown in Appendix B – Alignment/Split Sample Tolerance Limits.

4.4.5 Calibration Standards for Laboratory Equipment

The standards for calibration and the frequencies for laboratory equipment calibrations are given in:

A. Tex-198-E, "Minimum Standards for Testing Soils and Flexible Base Materials";
B. Tex-237-F, "Minimum Standards for Acceptance of a Laboratory for Hot Mix Testing";
C. Tex-498-A, "Minimum Standards for Testing Aggregate and Concrete Materials"; and
D. Tex-900-K Series, procedures for calibrating, verifying, and certifying equipment and devices.

4.4.6 Frequency for Laboratory Qualification

Laboratories are qualified at an interval not to exceed three years. Calibration or verification is required whenever the laboratory or equipment is moved.

4.4.7 Documentation

The project owner is responsible for verifying that laboratories are qualified to perform TxDOT testing. Documentation must be kept by the qualified laboratory and the project owner. Calibration records will be maintained for at least 10 years in accordance with the State of Texas Records Retention Schedule, unless another agency requires a longer period.

4.4.8 Non-Compliance

A laboratory that does not meet requirements is subject to disqualification. Any equipment in a qualified laboratory failing to meet specified equipment requirements for a specific test method will not be used for that test method.

4.4.9 Resolution of Disputes

The next higher qualification authority will resolve disputes concerning calibration and verification of equipment. For disputes that cannot be resolved at the project level, TxDOT MTD will be the final authority.

4.4.10 Laboratory Accreditation

In addition to TxDOT laboratory qualification, IA, referee, and central laboratories of IQFs and OVFs will be accredited by one of the following FHWA- and TxDOT-approved AAP accrediting bodies:

A. AASHTO re:source and CCRL;
B. Construction Materials Engineering Council (CMEC); or
C. Laboratory Accreditation Bureau (L-A-B).

The accreditation must be maintained throughout the life of the project. A copy of the accreditation certificates will be transmitted to TxDOT upon receipt by the testing laboratory. The accreditation will include all test methods equivalent to TxDOT's test methods shown in Appendix H – Minimum Qualification Requirements for Laboratories that the laboratory is performing. The IA, referee, and central laboratories of the IQF and OVF will be required to grant the IA laboratory and TxDOT MTD permission to monitor the laboratories' accreditation status. In the event of a suspension or revocation in a required method, the laboratory will provide formal documentation explaining why the suspension or revocation occurred and when it will be reinstated.

The IQF and OVF project or field laboratories do not have to be AAP-accredited but will implement and follow the quality management system of their accredited central laboratory. The IQF and OVF project or field laboratories must be qualified by the project IA laboratory.

To perform a test at the project laboratory, the firm's central laboratory AAP accreditation must include the methods shown in Appendix H – Minimum Qualification Requirements for Laboratories. The project laboratory also must provide documentation that it has implemented the accredited central laboratory's quality system, including:

A. A copy of the central laboratory quality manual revised to include project laboratory specific location, test methods, and personnel; and
B. Record of an internal audit by the central laboratory verifying compliance with the requirements of AASHTO R18-17, Section 5.6, Figures X1.3 and X1.4.

The IA qualification of the project laboratory will be based on a review of the project laboratory quality manual and internal audit, and a laboratory visit to check equipment availability and calibration. Personnel qualification will be performed as discussed in Section 4.3 – Personnel Qualifications.

The project laboratory quality system will be updated for each new mobilization of laboratory equipment. In addition, the IA laboratory will perform a project laboratory qualification before the start of testing using the added equipment.

In addition, the laboratory must participate in the proficiency sample testing as specified by the accrediting body. Before construction starts, the firm's central laboratory will grant the IA laboratory and TxDOT MTD permission to monitor the laboratory's performance on proficiency samples and review corrective actions for low ratings.

4.4.11 Annual Report

The IA laboratory will compile and submit a project-level IA report to TxDOT MTD QA, IA program manager.

TxDOT MTD will prepare and submit an annual report to the FHWA Division Administrator summarizing the results of TxDOT's systems approach IA program. This report will identify:

A. Number of sampling and testing personnel evaluated by the systems approach IA testing;
B. Number of IA evaluations found to be acceptable;
C. Number of IA evaluations found to be unacceptable; and
D. Summary of any significant systemwide corrective actions taken.

5 CDA/Design-Build QAP Implementation Guide

The TxDOT *Quality Assurance Program for CDA/Design-Build Projects Implementation Guide* provides guidance for the finalization and implementation of the QAP for CDA and Design-Build Agreement (DBA) projects undertaken by the Texas Department of Transportation (TxDOT).

The guide covers four primary topics:

1. Finalization of the DB QAP;
2. Approval of the OVTIP and the CQMP;
3. Implementation of the approved DB QAP during construction; and
4. Closing out the project.

The primary objectives of the guide are to:

1. Provide consistency and practical guidance in the QAP implementation processes on TxDOT CDA/DBA projects, and
2. Outline the processes for finalizing the CDA or DB QAP, approving the OVTIP and CQMP, implementing the approved CDA or DB QAP during construction, and closing out the project.

APPENDIX A

ACRONYMS AND DEFINITIONS

The following terms and definitions are referenced in this manual and have the meanings set forth below.

AAP	AASHTO Accreditation Program
AASHTO	American Association of State Highway Transportation Officials
ACI	American Concrete Institute
APCM	AASHTOWare Project Construction & Materials
AQMP	Aggregate Quality Monitoring Program
ASTM	American Society for Testing and Materials
BABA	Buy America and Build America
BMP	Best Management Practice
CAR	Corrective Action Report
CCMS	Construction Contract Management System
CCRL	Cement and Concrete Reference Laboratory
CCSC	Concrete Certification Steering Committee
CDA	Comprehensive Development Agreement
CDR	Construction Deficiency Report
CFR	Code of Federal Regulations
CMEC	Construction Materials Engineering Council
CQCM	Construction Quality Control Manager
CQMP	Construction Quality Management Plan
CVL	Controlled Vocabulary List
DBA	Design-Build Agreement
DMS	Departmental Material Specifications
ECMS	Electronic Content Management System
EJ	Engineering Judgment
EOR	Engineer of Record
ESOC	Early Start of Construction
FHWA	Federal Highway Administration
HMA	Hot-Mix Asphalt
HMAC	Hot-Mix Asphalt Center
HMCSC	Hot-Mix Certification Steering Committee
IA	Independent Assurance
IAF	Independent Assurance Firm
IAQP	Independent Assurance Quality Plan
IQ	Independent Quality

IQF	Independent Quality Firm
IQFM	Independent Quality Firm Manager
ISO	International Organization for Standardization
I2MS	Inspection and Materials Management System
JMF	Job-Mix Formula
L-A-B	Laboratory Accreditation Bureau
MCL	Materials Certification Letter
MPL	Material Producer List
MTD	Materials and Tests Division
MTD-DD	MTD Division Director
NCR	Non-Conformance Report
NDC	Notice of Design Change
NDLA	Next Day Look-Ahead
NDT	Non-Destructive Testing
OFI	Opportunity for Improvement
OV	Owner Verification
OVF	Owner Verification Firm
OVI	Owner Verification Inspection
OVTIP	Owner Verification Testing and Inspection Plan
PBS	Project Baseline Schedule
PM	Project Manager
PWL	Percent Within Limits
QA	Quality Assurance
QAP	Quality Assurance Program
QC	Quality Control
RFC	Released-for-Construction
RFI	Request for Information
TCP	Traffic Control Plan
TxAPA	Texas Asphalt Pavement Association
TxDOT	Texas Department of Transportation
XML	Extensible Markup Language

Acceptance Program—all factors that comprise TxDOT's program to determine quality of the product as specified in the contract requirements. These factors include acceptance and verification sampling, testing, and inspection, and may include results of quality control sampling and testing.

Aggregate Quality Monitoring Program (AQMP)—governed by Tex-499-A, provides the requirements and procedures for the Materials and Tests Division (MTD) to accept aggregate products that have demonstrated continuing quality and uniformity.

Construction Deficiency Items—work features that are typically still "work in progress"; are not a finished product and do not require a design change; or can be reworked in the field to be in compliance with the original requirements immediately or in a later construction phase. These will be

documented and reworked in accordance with the governing design and/or specifications and re-inspected by construction QC and IQF staff for compliance. These deficiencies shall be noted in the daily inspection reports and entered in the CDR log.

Construction Deficiency Report (CDR)—a report of how Construction Deficiency Items have been documented and resolved.

Contract Documents—meaning set forth in the executed agreement between TxDOT and DB Contractor.

Controlled Vocabulary List—the list of agreed-upon nomenclature used to uniquely identify each IQF and OV testing report.

Design Firm—the qualified licensed professional engineer's firm responsible for the design of the Project.

Design Documents—all drawings (including plans, profiles, cross-sections, notes, elevations, sections, details, and diagrams), specifications, reports, studies, calculations, electronic files, records, and submittals necessary for, or related to, the design of the Project and/or the utility adjustments in accordance with the Contract Documents, the Governmental Approvals, and applicable Law.

DB Contractor—the entity identified in the Agreement to perform Work under the Project, together with its successors and assigns.

Effective Date—is defined in the Design-Build Agreement (DBA).

Electronic Content Management System (ECMS)—the secure electronic content management system containing the data required in connection with the Contract Documents.

Engineer—when interpreting standards, policies, and specifications referenced in the TxDOT Standard Specifications and Design-Build Specifications, the following apply:

A. References to the project owner mean TxDOT; and

B. References to the Engineer in the context of provider of compliance judgment may mean the Professional Services Quality Assurance Firm (PSQAF); the Independent Quality Firm (IQF); or a TxDOT representative, depending on the context, as determined by TxDOT in its discretion.

Engineering Judgment (EJ)—determinations as to whether a material failing to meet specification requirements and not within applicable tolerances should be accepted, or not accepted, will be based upon sound engineering principles, experience, and/or related results of applicable material tests, and be made by a licensed professional engineer.

Engineer of Record (EOR)—the engineers in responsible charge of each item, element, or phase of the Work shall possess the necessary licenses and registrations in the State of Texas and will be personally responsible for directly supervising the Work. The EOR will sign and seal the professional services product for a given item, element, or phase of the Work as applicable.

Final Acceptance—the occurrence of all of the events and satisfaction of all of the conditions set forth in the CDA or DBA, as and when confirmed by TxDOT's issuance of a certificate of Final Acceptance.

F-test—the statistical analysis to compare the variances of two independent sets of data.

Fixed Independent Test—location that is not determined by random numbers, such as due to a localized concern, and is also independent.

Fixed Split Test—sample location of a split sample that is determined by any other method other than the use of random numbers.

Governmental Approval—meaning set forth in the executed agreement between TxDOT and DB Contractor.

Governmental Entity—meaning set forth in the executed agreement between TxDOT and DB Contractor.

Hold Point—refers to a point in time when construction activities are temporarily stopped to confirm that the prerequisites for continuing Work are met. Construction inspection hold points occur when Work cannot be inspected later, and the associated Work area could be covered. All associated hold points shall be shown in the construction look-ahead schedules for each of the Work activities.

Independent Assurance Program—all activities that are included in an unbiased and independent evaluation program for all the sampling and testing procedures used in the Acceptance Program.

Independent Quality Firm (IQF)—the independent firm identified in the proposal (or such other firm approved by TxDOT in its discretion) responsible for managing the quality assurance program for the construction Work and performing independent quality sampling, testing, inspection, and audits of the CQMP.

Independent Test—sample location that is obtained independent of another sample location.

Law or **Laws**—meaning set forth in the executed agreement between TxDOT and DB Contractor.

Level of Significance (alpha)—the probability of erroneously rejecting the null hypothesis when it should have been accepted.

Licensed Professional Engineer (PE)—a person who is duly licensed and registered by the Texas Board of Professional Engineers to engage in the practice of engineering in the state.

Material Producer List (MPL)—TxDOT-approved products and materials from various manufacturers and producers, located at: www.txdot.gov/business/resources/producer-list.html

Non-Conforming Work (Non-Conformance)—Work that does not conform to the requirements of the Contract Documents, the Governmental Approvals, applicable Law, ESOC plans, or RFC documents.

Non-Conformance Report (NCR)—a report documenting Non-conforming Work and the ultimate disposition of such Non-conforming Work, including the efforts undertaken to repair, replace, or otherwise remediate such work in accordance with the Contract Documents.

Owner Verification (OV) Report—quarterly report developed by the OVF in conjunction with TxDOT to document the validation or verification of the materials quality and construction inspection requirements in accordance with the Contract Documents.

Owner Verification—testing and inspection performed as part of the validation or verification processes.

Owner Verification Firm—TxDOT, or its designated agent tasked with performing OV services.

Prefabricated Product Fabrication Plants—suppliers of prefabricated products that may be located at or near the Project site, or offsite.

Proficiency Samples—homogenous samples that are distributed and tested by two or more laboratories or personnel. The test results are compared to assure that the laboratories or personnel are obtaining the same results.

Project—meaning set forth in the Contract Documents.

Project Baseline Schedule (PBS)—the current project schedule submitted by the DB Contractor.

Qualification—a quality, ability, or accomplishment that makes a person technically competent for a particular position or task.

Quality Assurance—all planned and systematic actions necessary to provide confidence that a product or service will satisfy given requirements for quality.

Quality Assurance Program—the program for quality management and control of the Project and Work, as described in this document.

Quality Control—all contractor or vendor operational techniques and activities that are performed or conducted to fulfill the contract requirements.

Random Sampling—a process whereby each element of the population has an equal chance of being selected.

Random Test—the sample location is identified by applying a random number methodology to the entire sample lot so that each identifiable portion of the lot has an equal opportunity to be sampled and tested.

Rules—the Texas Administrative Code.

Split Sample—a sample that has been divided into two or more portions representing the same material.

Substantial Completion—the occurrence of all of the events and satisfaction of all of the conditions set forth in the Contract Documents, as and when confirmed by TxDOT's issuance of a certificate of substantial completion.

Subcontractor—any party with which the DB Contractor has entered into any subcontract to perform any part of the Work or provide any materials, equipment, or supplies for the Project on behalf of the DB Contractor, and any other party with which any Subcontractor has further subcontracted any part of the Work, at all tiers.

Supplier—any person not performing work at or on the site who supplies machinery, equipment, materials, hardware, software systems, or any other appurtenance to the Project to the DB Contractor or to any Subcontractor in connection with the performance of the Work. Persons who merely transport, pick up, deliver, or carry materials, personnel, parts, or equipment or any other items or persons to or from the site will not be deemed to be performing Work at the site.

TxDOT Standard Specifications—the *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* adopted by the Texas Department of Transportation, including all revisions thereto applicable on the effective date of the Contract Documents.

t-test—the statistical analysis to compare the means of two independent sets of data.

Utility(ies) or utility(ies)—a public, private, cooperative, municipal, and/or government line, facility, or system used for the carriage, transmission, and/or distribution of cable television, electric power, telephone, telegraph, water, gas, oil, petroleum products, steam, chemicals, hydrocarbons, telecommunications, sewage, stormwater not connected with the drainage of the Project, and similar substances that directly or indirectly serve the public. The term "Utility(ies)" or "utility(ies)" also includes radio towers or transmission towers (including cellular). Oil and gas gathering lines and production supply lines are included in this definition and are classified as a Utility.

Utility Owner—the owner or operator of any Utility (including privately held and publicly held entities, cooperative utilities, and municipalities and other governmental agencies).

Vendor—a supplier of project-produced material that is not the DB Contractor.

Verification Testing—sampling and testing performed to verify the quality of the product. The sampling and testing must be performed by qualified testing personnel employed by TxDOT, excluding the DB Contractor and vendor.

Work—all of the work required under the Contract Documents, including all administrative, Professional Services, engineering, real property acquisition and occupant relocation, support services, utility adjustment work to be furnished or provided by the DB Contractor, reimbursement of Utility Owners for utility adjustment work furnished or provided by such Utility Owners or their contractors and consultants, procurement, professional, manufacturing, supply, installation, construction, landscaping, supervision, management, testing, verification, labor, materials, equipment, maintenance, documentation, and other duties and services to be furnished and provided by the DB Contractor as required by the Contract Documents, including all efforts necessary or appropriate to achieve Final Acceptance of the Project, except for those efforts that such Contract Documents expressly specify will be performed by Persons other than the DB Contractor-Related Entities.

APPENDIX B

ALIGNMENT/SPLIT SAMPLE TOLERANCE LIMITS

At least five split samples for Level 1 and Level 2 tests will be analyzed during startup operations to ensure alignment between IQF and OVF laboratories. Split sample test results must be within the tolerances established below.

Procedure	Test Method	Tolerance
Pulverization Gradation	Tex-101-E, Part III	>No. 4 sieve: ±5% points ≤No. 4 sieve: ±3% points
Determining Moisture Content in Soil Materials	Tex-103-E	±1% point
Liquid Limit of Soils	Tex-104-E	15% of mean[1]
Plastic Limit of Soils	Tex-105-E	15% of mean[1]
Plasticity Index of Soils	Tex-106-E	20% of mean[1]
Bar Linear Shrinkage	Tex-107-E	±2%
Particle Size Analysis of Soils, Part I	Tex-110-E	>No. 4 sieve: ±5% points ≤No. 4 sieve: ±3% points
Moisture-Density Relationship of Base Materials	Tex-113-E	Density: 2.0 pcf of mean[1] Moisture content: ±0.5% points
Moisture-Density Relationship of Subgrade, Embankment Soils, and Backfill Material	Tex-114-E	Density: 2.0 pcf of mean[1] Moisture content: ±0.5% points
In-Place Density of Soils and Base Materials	Tex-115-E	±2.5%
Wet Ball Mill	Tex-116-E	10% of mean[1]
Compressive Strength for Disturbed Soils and Base Materials	Tex-117-E	±15 psi
Compressive Strength for Soil-Cement Materials	Tex-120-E	±15 psi
Compressive Strength for Soil-Lime Materials	Tex-121-E	±15 psi
Molding, Testing, and Evaluating Bituminous Black Base Materials	Tex-126-E	±1.0%
Determining Soil pH	Tex-128-E	±0.2
Measuring the Resistivity of Soil Materials	Tex-129-E	±1,000 ohm-cm
Measuring Thickness of Pavement Layer	Tex-140-E	0.25 in.
Determining Sulfate Content in Soils—Colorimetric Method	Tex-145-E	±500 ppm
Soil Organic Content Using UV-Vis Method	Tex-148-E	±0.2%

Procedure	Test Method	Tolerance
Sieve Analysis of Fine and Coarse Aggregates	Tex-200-F	>5/8" sieve: ±5% points (individual % retained) ≤5/8"—No. 200 sieve: ±3% points (individual % retained) Passing No. 200 sieve: ±1.6% points
Sand Equivalent Test	Tex-203-F	±5
Compacting Specimens Using the Texas Gyratory Compactor (TGC)	Tex-206-F	±1.0% laboratory-molded density calculated in accordance with Tex-207-F
Determining Density of Compacted Bituminous Mixtures	Tex-207-F	Laboratory-molded density: ±1.0% Laboratory-molded bulk specific gravity: ±0.020 In-place air voids (cores): ±1.0%
Determining Asphalt Content	Tex-210-F	±0.3%
	Tex-228-F	±0.3%
	Tex-236-F	±0.3%
Determining Moisture Content of Bituminous Mixtures	Tex-212-F	±0.2%
Determining Deleterious Material in Coarse Aggregates	Tex-217-F	±0.3%
Decantation Test for Coarse Aggregate	Tex-217-F	20% of mean[1]
Flakiness Index	Tex-224-F	±5%
Indirect Tensile Strength	Tex-226-F	±12 psi
Theoretical Maximum Specific Gravity of Bituminous Mixtures	Tex-227-F	±0.020
Draindown Characteristic of Bituminous Mixture	Tex-235-F	±0.70%
Hamburg Wheel-Tracking Testing	Tex-242-F	±2-mm rut depth at specified number of passes
Cantabro Loss	Tex-245-F	±5%
Permeability or Water Flow of Hot-Mix Asphalt	Tex-246-F	±6 seconds

Procedure	Test Method	Tolerance
Sieve Analysis of Concrete Fine and Coarse Aggregate	Tex-401-A	>No. 4 sieve: ±5% points ≤No. 4 sieve: ±3% points
Fineness Modulus of Concrete Fine Aggregate	Tex-402-A	±0.2
Decantation Test for Concrete Aggregates	Tex-406-A	20% of mean[1]
Determining Deleterious Material in Concrete Mineral Aggregate	Tex-413-A	±0.3%
Air Content of Freshly Mixed Concrete by the Volumetric Method[2, 3]	Tex-414-A	±1.0%
Slump of Hydraulic Cement Concrete	Tex-415-A	±1 in.
Air Content of Freshly Mixed Concrete by the Pressure Method[3]	Tex-416-A	±1%
Compressive Strength of Cylindrical Concrete Specimens	Tex-418-A	20% of mean[1] (3 × 6 in.) 17% of mean[1] (4 × 8 in.) 14% of mean[1] (6 × 12 in.)
Measuring Temperature of Freshly Mixed Portland Cement Concrete	Tex-422-A	2°F
Concrete Thickness/Depth of Reinforcement/Saw Cut Depth by Direct Measurement	Tex-423-A	Part I: ±0.25 inches Part II: ±0.25 inches Part III: ±0.25 inches
Determining Compressive Strength of Grouts	Tex-442-A	20% of the mean[1] (2-in. cubes)
Coarse Aggregate Angularity	Tex-460-A	±5
Micro-Deval Abrasion	Tex-461-A	±2%
Moisture Susceptibility of Bituminous Materials	Tex-530-C	±10%
Dynamic Cone Penetrometer	ASTM D6951	Modulus: ±1 ksi for a depth of 6 inches
Operating Inertial Profilers and Evaluating Pavement Profiles (Ride Quality)	Tex-1001-S	Surface test Type B: ±3 in./mile

[1] The difference between compared test results will not exceed the indicated deviation from the mean of the compared test results where the mean is the average of the test results.

[2] Required when volumetric method is used.

[3] Required only when air-entrained concrete is specified.

APPENDIX C

IQF DATA TRANSFER REQUIREMENTS

XML submission allows for the transfer of all IQF laboratory test results into I2MS from other IQF data systems without additional levels of data entry. An example XML sample submission and I2MS test form fields are available at the following link: https://www.txdot.gov/content/dam/docs/division/mtd/i2ms-test-form-fields.pdf.

If there is a specific test that is not listed in the database that is required in I2MS, the schema and report setup will need to be submitted to TxDOT for approval, 60 days before testing submission.

APPENDIX D

OV LEVELS FOR MATERIALS TESTING VALIDATION/VERIFICATION

Startup Requirements

During startup operations, in addition to random sample location testing, the IQF (Independent Quality Firm) and OVF (Owner Verification Firm) will perform testing on at least five split samples for all tests listed as Level 1 or Level 2 to ensure alignment. The OVF will evaluate split sample results against TxDOT's split sample tolerance limits contained in Appendix B. For those test methods that do not verify during startup operations, the IQF and OVF will collaborate to determine the cause(s) of the non-verification and will take appropriate corrective actions during the early phases of material production to align the testing operations. For tests listed as Level 3, the OVF will observe and review the IQF's initial startup testing operations.

The levels of significance (α) used for statistical analyses are provided below unless otherwise approved in writing by TxDOT.

Material Category	Level of Significance (α)
Embankment, Subgrades, Backfill, and Base Courses	0.01
Asphalt-Treated Base (Plant-Mixed)	0.01
Surface Treatments	0.01
Hydraulic Cement Concrete—Structural	0.025
Hydraulic Cement Concrete—Non-Structural	0.01
Hydraulic Cement Concrete Pavements	0.025
Hot-Mix Asphalt Pavement (Items 341, 342, 344, and 346)	0.025

At minimum, perform testing using the levels listed below.

Level 1 Tests: F- and t- tests

The OVF will perform continuous F- and t-test analyses on Level 1 tests with the minimum OV testing frequency set at the higher of 10% of the IQF testing frequency or three OV tests per quarter (when required number of IQF tests is three or more per quarter). The continuous analysis, as described in Appendix I – I2MS 3.2 Continuous Analysis Algorithm, will be run daily, with new OV test results being added to the OV sample population as older OV test results are removed. The analyses will be performed against the corresponding IQF sample population. If the number of IQF tests required to meet the DB Guide Schedule is three or fewer per quarter, then the number of OV tests required per quarter will be the same as the number of IQF tests. OV sampling and testing frequency will not be greater than the IQF sampling and testing frequency.

Level 2 Tests: Independent Verification

The OVF will perform independent verification on Level 2 tests with the minimum OV testing frequency of three per quarter with lower frequency tests missed during one quarter being specifically targeted the next quarter. This verification will be performed by comparing the independent OV test results to a group of corresponding IQF test results as an independent check of the IQF test results. For small materials quantities used per quarter where required IQF number of tests per the DB Guide Schedule is three or fewer, OVF testing frequency will be the minimum DB Guide Schedule testing frequency.

Level 3 Tests: Observation Verification

The OVF will observe and review the IQF's initial startup testing operations and records, as appropriate. Periodic observation verification shall also be performed during ongoing production operations to verify compliance with test procedures. Split testing may be used during initial startup testing to verify alignment between OVF and IQF laboratories.

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
EMBANKMENTS, SUBGRADES, BACKFILL, AND BASE COURSES			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NO.**	**TxDOT RECOMMENDED**
EMBANKMENT (CUTS AND FILLS)	Liquid Limit	Tex-104-E	2
	Plasticity Index	Tex-106-E	1
	Linear Shrinkage	Tex-107-E	2
	Gradation	Tex-110-E	2
	Moisture/Density	Tex-114-E[1]	3
	In-Place Density	Tex-115-E[1], Part I	1
	Moisture Content (Roadway)		2[2]

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
EMBANKMENTS, SUBGRADES, BACKFILL, AND BASE COURSES			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NO.**	**TxDOT RECOMMENDED**
RETAINING WALL (NON-SELECT BACKFILL)	Liquid Limit	Tex-104-E	2
	Plasticity Index	Tex-106-E	1
	Linear Shrinkage	Tex-107-E	2
	Gradation	Tex-110-E	2
	Moisture/Density	Tex-114-E[1]	3
	In-Place Density	Tex-115-E, Part I	1
RETAINING WALL (SELECT BACKFILL)	Plasticity Index (Ty CS)	Tex-106-E	1
	Gradation (Backfill/Drainage Aggregate)	Tex-401-A/Tex-110-E	2
	Resistivity	Tex-129-E	2
	pH	Tex-128-E	2
	In-Place Density	Tex-115-E[1]	1
UNTREATED SUBGRADE	Uniformity: Dynamic Cone Penetration	ASTM D6951	2[2]
UNTREATED BASE COURSES	Liquid Limit	Tex-104-E	2
	Plasticity Index	Tex-106-E	1
	Linear Shrinkage	Tex-107-E	2
	Gradation	Tex-110-E	2
	Crushed Face Count	Tex-460-A, Part I	2
	Moisture/Density	Tex-113-E[1]	3
	Wet Ball Mill	Tex-116-E	2
	Strength	Tex-117-E	2
	In-Place Density	Tex-115-E[1], Part I	1
	Moisture Content (Roadway)		2[2]
	Thickness	Tex-140-E	2[2]

OV Levels for Materials Testing Verification		Level 1	Level 2	Level 3
EMBANKMENTS, SUBGRADES, BACKFILL, AND BASE COURSES				
MATERIAL OR PRODUCT		**TEST FOR**	**TEST NO.**	**TxDOT RECOMMENDED**
		Ride Quality—Surface Test Type B	Tex-1001-S	2[3]
TREATED SUBGRADE AND BASE COURSES	Subgrade Before Treatment	Organic Content	Tex-148-E	2
		Sulfate Content	Tex-145-E, Part II	2
	New Base Material	Liquid Limit	Tex-104-E	2
		Plasticity Index	Tex-106-E	1
		Linear Shrinkage	Tex-107-E	2
		Gradation	Tex-110-E	2
		Wet Ball Mill	Tex-116-E	2
		Strength	Tex-117-E	2
	Uncompacted Mixture	Pulverization Gradation	Tex-101-E, Part III	2
		Moisture Content (when performed by IQF)	Tex-103-E	2
		Moisture-Density and Compressive Strength (Cement-Treated Materials)	Tex-120-E, Part II	2
		Moisture-Density and Compressive Strength (Lime-Treated Materials)	Tex-121-E, Part II	2
	Compacted Mixture	In-Place Density	Tex-115-E[1], Part I	1
		Moisture Content (Roadway)		2[2]
		Thickness	Tex-140-E	2[2]
		Uniformity: Dynamic Cone Penetration (for treated subgrade only)	ASTM D6951	2[2]
RECLAIMED ASPHALT PAVEMENT (RAP), CRUSHED CONCRETE, AND RECYCLED MATERIALS		Sulfate Content (Crushed Concrete Only)	Tex-145-E, Part II	2
		Deleterious Material	Tex-413-A	2
		Decantation	Tex-406-A	2

[1] OV Use of IQF Proctors

- During startup operations, test five split samples with the IQF and ensure that all values are within the split sample tolerance, currently set at 2.0 pcf of mean, as specified in Appendix B.
- The IQF must provide OV laboratory with complete curve data for all proctor tests. Before testing in-place densities, IQF will furnish the selected curve for each in-place density point.
- The OVF either agrees that the IQF proctor is representative of the material being tested or will obtain in-place density values and sample the material to conduct a one-point proctor to ensure that proctor values are within 2.0 pcf of curve estimates.

[2] OVF shall perform a minimum 10% of IQF sampling and testing frequency.

[3] OVF shall perform Ride Quality "verification testing" in accordance with TxDOT's Standard Specification Section 585.3.2.2.2.1.

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
ASPHALT-TREATED BASE (Plant-Mixed)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
AGGREGATE	Liquid Limit	Tex-104-E	2
	Plasticity Index	Tex-106-E	1
	Linear Shrinkage	Tex-107-E	2
	Wet Ball Mill Method	Tex-116-E	3
RAP AND RECYCLED AGGREGATE	Decantation	Tex-406-A, Part I	2
COMPLETE MIXTURE	Lab-Molded Density	Tex-126-E	1
	Gradation	Tex-200-F, Part I	2
	Percent Asphalt	Tex-236-F	1
	Moisture Content	Tex-212-F, Part II	3
	Indirect Tensile Strength	Tex-226-F	3
	Moisture Susceptibility	Tex-530-C	3
ROADWAY	Ride Quality	Surface Test Type A	3
	In-Place Air Voids	Tex-207-F	1

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3

SEAL COAT			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
AGGREGATE	Gradation	Tex-200-F, Part I	1
	Crushed Face Count	Tex-460-A, Part I	2
	Deleterious Material	Tex-217-F, Part I	2
	Decantation	Tex-406-A	2
	Flakiness Index	Tex-224-F	3
PRECOATED AGGREGATE	Asphalt Content	Tex-210-F (Tex-236-F)	2

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3

HYDRAULIC CEMENT CONCRETE—STRUCTURAL (Classes: C, F, H, S, CO, K, LMC, or SS)				
MATERIAL OR PRODUCT		**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
MINERAL AGGREGATE	COARSE AGGREGATE	Decantation	Tex-406-A	2
		Sieve Analysis	Tex-401-A	2
		Deleterious Materials	Tex-413-A	3
	FINE AGGREGATE	Sand Equivalent	Tex-203-F	2
		Organic Impurities	Tex-408-A	3
		Sieve Analysis	Tex-401-A	2
		Fineness Modulus	Tex-402-A	2
		Deleterious Material	Tex-413-A	3
CONCRETE		Compressive Strength	Tex-418-A	1
		Entrained Air (when specified by plans)	Tex-416-A or Tex-414-A	1

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
CONCRETE (CONTINUED)	Slump	Tex-415-A	2
	Temperature of Concrete	Tex-422-A	2
	Bridge Deck or Culvert Top Slab Thickness and Depth of Reinforcement	Tex-423-A, Part II	2[1]

[1] OVF shall perform a minimum 10% of IQF testing frequency of total number of bays per span. At least three concrete thickness and steel depth readings per bay are required by test procedure.

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
HYDRAULIC CEMENT CONCRETE—NON-STRUCTURAL (Classes: A, B, D, or E)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
CONCRETE	Compressive Strength	Tex-418-A	2

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
GROUT (VARIOUS APPLICATIONS)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
GROUT	Compressive Strength	Cylinders: Tex-418-A or Cubes: Tex-442-A	2

OV Levels for Materials Testing Verification		Level 1	Level 2	Level 3
HYDRAULIC CEMENT CONCRETE PAVEMENTS (Classes: P, CO, LMC, K, or HES)				
MATERIAL OR PRODUCT		**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
MINERAL AGGREGATE	COARSE AGGREGATE	Decantation	Tex-406-A	2
		Sieve Analysis	Tex-401-A	2
		Deleterious Materials	Tex-413-A	3
	FINE AGGREGATE	Sand Equivalent	Tex-203-F	2
		Organic Impurities	Tex-408-A	3
		Sieve Analysis	Tex-401-A	2
		Fineness Modulus	Tex-402-A	2
		Deleterious Material	Tex-413-A	3
CONCRETE		Strength	Tex-418-A	1
		Slump (Formed Pavement)	Tex-415-A	2
		Entrained Air (when specified by plans)	Tex-414-A or Tex-416-A	1
		Temperature	Tex-422-A	2
		Thickness	Tex-423-A, Part I	2[1]
		Saw Cut Depth	Tex-423-A, Part III	2[1]
		Pavement Texture (only if carpet drag is used)	Tex-436-A	2
		Ride Quality	Tex-1001-S	2[2]

[1] OVF shall perform a minimum 10% of IQF testing frequency.
[2] OVF shall perform Ride Quality "verification testing" in accordance with TxDOT's Standard Specification Section 585.3.2.2.2.1.

OV Levels for Materials Testing Verification	Level 1	Level 2	Level 3
HOT-MIX ASPHALT PAVEMENT (Items 341, 342, 344, 346, 347, and 348)			
MATERIAL OR PRODUCT	**TEST FOR**	**TEST NUMBER**	**TxDOT RECOMMENDED**
COARSE AGGREGATE	Micro-Deval Abrasion	Tex-461-A	3
	Mix Design	Tex-204-F	3
FINE AGGREGATE	Sand Equivalent	Tex-203-F	3
COMPLETE MIXTURE	Asphalt Binder Content	Tex-236-F	1
	Gradation	Tex-200-F	2
	Moisture Susceptibility	Tex-530-C	3
	Indirect Tensile Strength (Dry)	Tex-226-F	3
	Moisture Content	Tex-212-F, Part II	3
	Theoretical Maximum Specific Gravity	Tex-227-F	2
	Lab-Molded Density	Tex-207-F, Parts I and VI	1
	Drain-Down	Tex-235-F	3
	Hamburg Wheel Test	Tex-242-F	3
	Cantabro Loss	Tex-245-F	3
	Overlay Test	Tex-248-F	3
ROADWAY	In-Place Air Voids	Tex-207-F, Parts I and VI	1
	Segregation Profile	Tex-207-F, Part V	3
	Longitudinal Joint Density	Tex-207-F, Part VII	3
	Ride Quality	Tex-1001-S	2[1]
	Thermal Profile	Tex-244-F	3
	Permeability	Tex-246-F	3

[1] OVF shall perform Ride Quality "verification testing" in accordance with TxDOT's Standard Specification Section 585.3.2.2.2.1.

APPENDIX E

TEST METHODS FOR PERSONNEL QUALIFICATIONS

The below certification levels shall be verified to ensure there are not any recent changes. The current HMAC certifications can be viewed at https://www.txhmac.org/certifications/.

Test Procedure	HMAC—Soils and Flexible Base Testing Certifications
	Level SB 101
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Parts I and II)
Tex-103-E	Determining Moisture Content in Soil Materials
Tex-104-E	Determining Liquid Limit of Soils
Tex-105-E	Determining Plastic Limit of Soils
Tex-106-E	Calculating the Plasticity Index of Soils
Tex-107-E	Determining Bar Linear Shrinkage of Soils
Tex-110-E	Particle Size Analysis of Soils (Part I)
Tex-111-E	Material Passing the No. 200 Sieve for Soils and Base Materials
Tex-116-E	Ball Mill Method for Determining the Disintegration of Flexible Base Material
Tex-142-E	Laboratory Classification of Soils for Engineering Purposes
Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
Tex-600-J	Sampling and Testing Lime (Part I)
	Level SB 102
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Part III)
Tex-103-E	Determining Moisture Content in Soil Materials
Tex-115-E	Measuring In-Place Density and Moisture Content of Soils and Base Materials (Parts I and IV)
Tex-140-E	Measuring Thickness of Pavement Layer
Tex-221-F	Sampling Aggregate and Limestone Rock Asphalt (LRA)
Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
Tex-600-J	Sampling and Testing Lime (Part I)
	Level SB 103
Tex-100-E	Surveying and Sampling of Soils for Highways
Tex-101-E	Preparing Soil and Flexible Base Materials for Testing (Parts I and II)
Tex-128-E	Determining Soil pH
Tex-129-E	Measuring the Resistivity of Soils
Tex-145-E	Determining Sulfate Content in Soils, Colorimetric Method
Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
Tex-600-J	Sampling and Testing Lime (Part I)
	Level SB 201
Tex-113-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials

Test Procedure	HMAC—Soils and Flexible Base Testing Certifications
Tex-114-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade and Embankment Soil
Tex-120-E	Cement Treated Materials (Part I)
Tex-121-E	Lime Treated Materials (Part I)
	Level SB 202
Tex-117-E	Triaxial Compression for Disturbed Soils and Base Materials (Part II)
Tex-120-E	Soil-Cement Testing (Part II)
Tex-121-E	Soil-Lime Testing (Parts II and III)
Tex-128-E	Determining Soil pH

Test Procedure	HMAC—Hot-Mix Asphalt Testing Certifications
	Level 1A
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregate (Parts I and II)
Tex-204-F	Design of Bituminous Mixtures (VMA Calculation Only)
Tex-206-F	Compacting Specimens Using the Texas Gyratory Compactor (Part I)
Tex-207-F	Determining Density of Compacted Bituminous Mixtures (Parts I, VI, and VIII)
Tex-212-F	Determining Moisture Content of Bituminous Mixtures (Part II)
Tex-221-F	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and Limestone Rock Asphalt
Tex-222-F	Sampling Bituminous Mixtures
Tex-225-F	Random Selection of Bituminous Mixture Samples (Part I)
Tex-226-F	Indirect Tensile Strength Test
Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures (Part II)
Tex-233-F	Preparing Control Charts for Asphaltic Concrete Paving Projects
Tex-235-F	Determining Draindown Characteristics in Bituminous Materials
Tex-236-F	Determining Asphalt Content of Asphalt Paving Mixtures by Ignition Method (Part I)
Tex-241-F	Superpave Gyratory Compacting of Test Specimens of Bituminous Mixtures
Tex-242-F	Hamburg Wheel-Tracking Test
Tex-245-F	Cantabro Loss
Tex-251-F	Obtaining and Trimming Cores of Bituminous Mixture
Tex-500-C	Sampling Bituminous Materials, Pre-Molded Joint Fillers, and Joint Sealers (Parts I, II, III, and IX)
Tex-530-C	Effect of Water on Bituminous Paving Mixtures
	Level 1B
Tex-207-F	Determining Density of Compacted Bituminous Mixtures (Parts III, IV, V, and VII)
Tex-222-F	Sampling Bituminous Mixtures
Tex-225-F	Random Selection of Bituminous Mixture Samples (Part II)
Tex-244-F	Thermal Profile of Hot-Mix Asphalt
Tex-246-F	Permeability or Water Flow of Hot-Mix Asphalt
Tex-251-F	Obtaining and Trimming Cores of Bituminous Mixture

Test Procedure	HMAC—Hot-Mix Asphalt Testing Certifications
Tex-500-C	Sampling Bituminous Materials, Pre-Molded Joint Fillers, and Joint Sealers (Parts I, II, III, and IX)
	AGG101
Tex-107-F	Determining the Bar Linear Shrinkage of Soils
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregate (Parts I and II)
Tex-201-F	Bulk Specific Gravity and Water Absorption of Aggreate
Tex-203-F	Sand Equivalent
Tex-212-F	Determining Moisture Content of Bituminous Mixtures (Part II)
Tex-217-F	Determining Deleterious Material and Decantation Test for Coarse Aggregates
Tex-221-F	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and LRA
Tex-224-F	Determining Flakiness Index
Tex-280-F	Determining Flat and Elongated Particles
Tex-400-A	Sampling Flexible Base, Stone, Gravel, Sand, and Mineral Aggregates
Tex-401-A	Sieve Analysis of Fine and Coarse Aggregate
Tex-402-A	Fineness Modulus of Fine Aggregate
Tex-404-A	Determining Unit Mass (Weight) of Aggregates
Tex-406-A	Decantation Test for Concrete Aggregate (Part I)
Tex-408-A	Organic Impurities in Fine Aggregate
Tex-413-A	Determining Deleterious Material in Mineral Aggregate
Tex-460-A	Determining Crushed Face Particle Count (Part I)
Tex-461-A	Degradation of Coarse Aggregate by Micro-Deval Abrasion
	Level 2
Tex-204-F	Design of Bituminous Mixtures
Tex-205-F	Laboratory Method of Mixing Bituminous Mixtures
Tex-236-F	Determining Asphalt Content from Asphalt Paving Mixtures by the Ignition Method (Part II)

Test Procedure	American Concrete Institute (ACI) Certifications
	Concrete Field Testing Technician—Grade I
Tex-407-A	Sampling Freshly Mixed Concrete
Tex-414-A	Air Content of Freshly Mixed Concrete by the Volumetric Method
Tex-415-A	Slump of Portland Cement Concrete
Tex-416-A	Air Content of Freshly-Mixed Concrete by the Pressure Method
Tex-417-A	Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
Tex-422-A	Measuring Temperature of Freshly Mixed Portland Cement Concrete
Tex-447-A	Making and Curing Concrete Test Specimens (Part I)
	Concrete Strength Testing Technician
Tex-418-A	Compressive Strength of Cylindrical Concrete Specimens
Tex-448-A	Flexural Strength of Concrete Using Simple Beam Third-Point Loading
Tex-450-A	Capping Cylindrical Concrete Specimens

APPENDIX F

TEST METHODS FOR SPLIT/PROFICIENCY EVALUATION

After observation and qualification, each qualified technician is required to participate annually in one proficiency or split sample test for each test method requiring IA. Split sample test results must compare to the IA test results to within the established tolerance as described in Appendix B – Alignment/Split Sample Tolerance Limits. Proficiency sample test results must be within ±2 standard deviations of the proficiency sample mean.

The following table lists the test procedures required for evaluation.

Proficiency Sample Test Procedures	
Test Procedure	**Soils and Bases Proficiency Program**
Tex-104-E	Determining Liquid Limit of Soils
Tex-105-E	Determining Plastic Limit of Soils
Tex-106-E	Calculating the Plasticity Index of Soils
Tex-107-E	Determining the Bar Linear Shrinkage of Soils
Tex-110-E	Particle Size Analysis of Soils
Tex-113-E	Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials
Tex-117-E	Triaxial Compression for Disturbed Soils and Base Materials
HMA Proficiency Program	
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregate
Tex-207-F	Determining Density of Compacted Bituminous Mixtures
Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
Tex-236-F	Determining Asphalt Content of Asphalt Paving Mixtures by the Ignition Method
Tex-241-F	Compacting Bituminous Specimens Using the Superpave Gyratory Compactor (SGC)
Concrete Proficiency Program	
Tex-418-A	Compressive Strength of Cylindrical Concrete Specimens

APPENDIX G

IQF MONTHLY CERTIFICATION

The intent of the certification is to ensure that the quality of all workmanship and materials incorporated into the project is in conformance with the Contract Documents, ESOC plans, temporary Work plans, RFC plans, approved working and shop drawings, and specifications, thus ensuring a service life equivalent to the design life. Any Work represented by an acceptance decision that does not meet the criteria contained in the Contract Documents, ESOC plans, temporary Work plans, RFC plans, approved working and shop drawings, and specifications is considered an exception. Exceptions should be investigated to determine whether in fact the material and Work are in reasonably close conformity with the plans and specifications. Non-conforming materials and workmanship will be tracked, monitored, and appropriately addressed.

Submit the signed and sealed certification (below) by the IQFM monthly. The OV report will include the IQF monthly certifications.

IQF Certification

Draw Request No. __ Certification

The undersigned hereby certifies that:

1. Except as specifically noted in this certification, all Work that is the subject of the Draw Request, including Subcontractors and Suppliers, has been checked or inspected by the Independent Quality Firm, with respect to the construction Work;
2. Except as specifically noted in this certification, all Work that is the subject of the Draw Request has been inspected and tested in accordance with the approved CQMP (including the DB Guide Schedule), and there are no known deficiencies, non conformances, or other deviations that are outstanding associated with the Work that is the subject of this Draw Request. Therefore, the Work conforms to the requirements of the Contract Documents;
3. The results of the tests used in the acceptance program indicate that the materials incorporated in the construction Work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications;
4. All the measures and procedures provided in the Construction Quality Management Plan are functioning properly and are being followed;
5. The construction percentages and incorporated material values indicated are accurate and correct; and
6. All quantities for which payment is requested on a unit price basis are accurate. Such quantities have been submitted to TxDOT as part of the payment request.

Exceptions:

_____

_____

Name: _____ Seal:
(Print)

Signature:

_____
Independent Quality Firm Manager

Date: _____

APPENDIX H

MINIMUM QUALIFICATION REQUIREMENTS FOR LABORATORIES

All laboratories performing acceptance testing for TxDOT require qualification, at minimum, in the test procedures identified in the tables below. Project-specific requirements may necessitate qualifications in additional test procedures. Qualification for IQF, OV, and IA central laboratories will be required through the AASHTO Accreditation Program (AAP) for those test methods identified in the tables below if those tests are performed by the laboratory. The accreditation must be maintained throughout the life of the project, and the laboratory must participate in the AASHTO re:source Proficiency Sample Program (PSP)/Concrete and Cement Reference Laboratory (CCRL) proficiency program. The project laboratory is required to implement the approved quality system from the central laboratory at the project laboratory, and provide documentation that this is complete. In addition, TxDOT MTD, or its designee, will qualify the laboratory in TxDOT test methods. The laboratory technicians must participate in the TxDOT hot-mix asphalt, concrete, and soils statewide proficiency programs with the results documented as indicated in Section 4 – Independent Assurance Program.

Embankments, Subgrades, Backfill, and Base Materials			
ASTM	**AASHTO**	**TxDOT**	**Description**
–	–	Tex-100-E	Surveying and Sampling of Soils for Highways
–	R58/R74	Tex-101-E	Preparing Soil and Flexible Base Materials for Testing
–	–	Tex-102-E	Determining Slaking Time
D2216	T265	Tex-103-E	Moisture Content in Soil Materials
D4318	T89/T90	Tex-104-E; Tex-105-E; Tex-106-E	Liquid Limit; Plastic Limit; Plasticity Index
	–	Tex-107-E	Bar Linear Shrinkage
D6913	T311	Tex-110-E	Particle Size Analysis of Soils, Part I
D1140	–	Tex-111-E	Amount of Material in Soils Finer than the 75 µm (No. 200) Sieve
–	Tex-113-E[1]	Tex-113-E	Compaction and Moisture-Density Relationship of Base Materials
D698	T99	Tex-114-E	Compaction and Moisture-Density Relationship of Subgrade, Embankment Soils, and Backfill Material
D6938	T310	Tex-115-E	Field Method for In-Place Density of Soils and Base Materials, Part I (Nuclear Gauge Method)
–	–	Tex-116-E	Ball Mill Method for Disintegration of Flexible Base Material
–	T208	Tex-117-E	Triaxial Compression for Disturbed Soils and Base Materials
D558	T134	Tex-120-E	Soil-Cement Testing
D5102	–	Tex-121-E	Soil-Lime Testing
–	–	Tex-124-E	Potential Vertical Rise
–	–	Tex-126-E	Laboratory Molded Density of Asphalt Treated Base
D4972	–	Tex-128-E	Soil pH
–	–	Tex-129-E	Resistivity of Soil Materials
–	–	Tex-140-E	Thickness of Pavement Layer
D2487	–	Tex-142-E	Laboratory Classification of Soils for Engineering Purposes

Embankments, Subgrades, Backfill, and Base Materials			
ASTM	**AASHTO**	**TxDOT**	**Description**
–	–	Tex-145-E	Sulfate Content in Soils—Colorimetric Method
–	–	Tex-146-E	Conductivity Test for Field Detection of Sulfates in Soil
–	Tex-148-E[1]	Tex-148-E	Organic Content
D3740	–	Tex-198-E	Minimum Standards for Acceptance of a Laboratory (Soils/Base)

1. Tex-113-E and Tex-148-E qualifications are offered by AASHTO.

Bituminous Mixtures			
ASTM	**AASHTO**	**TxDOT**	**Description**
D3203	T269	Tex-206-F	Compacting Specimens Using the Texas Gyratory Compactor
D2726	T166	Tex-207-F	Density of Compacted Bituminous Mixtures (SSD Method)
D6752	T331	Tex-207-F	Density of Compacted Bituminous Mixtures (Vacuum Method)
D8159 D2172	T164	Tex-210-F	Determining Asphalt Content of Bituminous Mixtures by Extraction
–	T329	Tex-212-F	Moisture Content, Part II
D75	–	Tex-221-F	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and Limestone Rock Aggregate
D979	–	Tex-222-F	Sampling Bituminous Mixtures
D6931	–	Tex-226-F	Indirect Tensile Strength
D2041	T209	Tex-227-F	Theoretical Maximum Specific Gravity of Bituminous Mixtures
D6390	–	Tex-235-F	Determining Draindown Characteristics in Bituminous Materials
D6307	T308	Tex-236-F	Asphalt Content by the Ignition Method
D3666	–	Tex-237-F	Minimum Standards for Acceptance of a Laboratory (HMA)
D6925	T312	Tex-241-F	Compacting Specimens Using the Superpave Gyratory Compactor
–	T324	Tex-242-F[1]	Hamburg Wheel-Tracking Test
–	–	Tex-244-F	Thermal Profile of HMA
–	–	Tex-245-F	Cantabro Loss
–	–	Tex-248-F[1]	Overlay Test
–	–	Tex-251-F	Obtaining and Trimming Cores of Bituminous Mixtures
D140	R66	Tex-500-C	Sampling Bituminous Materials, Pre-Molded Joint Fillers, and Joint Sealers
–	–	Tex-246-F	Permeability or Water Flow of HMA
–	–	Tex-530-C	Effect of Water on Bituminous Paving Mixtures

[1] IQF and OVF project/field laboratories performing Tex-242-F and Tex-248-F must be an approved laboratory from TxDOT's MPL.

Aggregates			
ASTM	**AASHTO**	**TxDOT**	**Description**
D5444	T30	Tex-200-F	Sieve Analysis of Fine and Coarse Aggregates
C128	T84	Tex-201-F	Bulk Specific Gravity and Water Absorption of Fine Aggregate
D2419	T176	Tex-203-F	Sand Equivalent
–	–	Tex-204-F	Design of Bituminous Mixtures
–	–	Tex-217-F	Deleterious Materials and Decantation for Coarse Aggregate
–	–	Tex-224-F	Flakiness Index
D4791	–	Tex-280-F	Flat and Elongated Particles
C702	T248	Tex-400-A	Sampling Stone, Gravel, Sand, and Mineral Aggregates
C136	T27	Tex-401-A	Sieve Analysis of Fine and Coarse Aggregate
–	–	Tex-402-A	Fineness Modulus of Fine Aggregate
C127	T85	Tex-403-A	Saturated Surface-Dry Specific Gravity and Absorption
C29	T19	Tex-404-A	Determining Unit Weight of Aggregate
C117	T11	Tex-406-A	Material Finer than the 75 µm (No. 200) Sieve in Mineral Aggregate
C40	T21	Tex-408-A	Organic Impurities in Fine Aggregate for Concrete
C566	T255	Tex-409-A	Free Moisture and Water Absorption
C131	T96	Tex-410-A	Abrasion of Coarse Aggregate Using the Los Angeles Machine
C88	T104	Tex-411-A	Magnesium Sulfate Soundness
C142	T112	Tex-413-A	Deleterious Materials
–	–	Tex-431-A	Pressure Slaking Test of Synthetic Coarse Aggregate
–	–	Tex-432-A	Coarse Aggregate Freeze-Thaw
–	T103	Tex-433-A	Absorption and Dry Bulk Specific Gravity of Lightweight Coarse Aggregate
D5821	–	Tex-460-A	Crushed Face Count
D6928	T327	Tex-461-A	Micro-Deval Abrasion
C1077	–	Tex-498-A	Minimum Standards for Acceptance of a Laboratory (Concrete and Aggregate)
–	–	Tex-499-A	Aggregate Quality Monitoring Program (AQMP) Surface Aggregate Classification (SAC)
–	–	Tex-612-J	Acid Insoluble Residue

Hydraulic Cement Concrete			
ASTM	**AASHTO**	**TxDOT**	**Description**
C172	T141	Tex-407-A	Sampling Freshly Mixed Concrete
C173	T196	Tex-414-A	Air Content of Freshly Mixed Concrete by the Volumetric Method
C143	T119	Tex-415-A	Slump of Hydraulic Cement Concrete
C231	T152	Tex-416-A	Air Content by the Pressure Method
C138	T121	Tex-417-A	Unit Weight, Yield, and Air Content (Gravimetric) of Concrete

C39	T22	Tex-418-A	Compressive Strength of Cylindrical Concrete Specimens
C1064	T309	Tex-422-A	Measuring Temperature of Freshly Mixed Portland Cement Concrete
–	–	Tex-423-A	Determining Concrete Thickness, Depth of Reinforcement, and Saw Cut Depth by Direct Measurement (Parts I, II, and III)
C42/C174	T24/T148	Tex-424-A	Obtaining and Testing Drilled Cores of Concrete
–		Tex-436-A	Measuring Texture Depth by Sand Patch Method
C942		Tex-442-A	Determining Compressive Strength of Grouts (Cubes)
C31	T23	Tex-447-A	Making and Curing Specimens
C617	T231	Tex-450-A	Capping Cylindrical Concrete Specimens
C1231	–	Tex-450-A	Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders
C1077	–	Tex-498-A	Minimum Standards for Acceptance of a Laboratory (Concrete and Aggregate)

Miscellaneous Procedures			
ASTM	**AASHTO**	**TxDOT**	**Description**
E329	–	–	Standard Specification for Inspection and Testing
D6951	–	–	Dynamic Cone Penetrometer
D3665	–	–	Standard Practice for Random Sampling of Construction Materials
–	–	Tex-600-J	Sampling and Testing Lime
		Tex-900-K	Calibration Procedures (calibrating, verifying, and certifying equipment and devices)
		Tex-1001-S	Ride Quality

	Preferred test procedure for AASHTO accreditation
	Acceptable test procedure for AASHTO accreditation
	Test procedure qualified by TxDOT MTD's designee or qualified IA laboratory approved by MTD

Note: Contact MTD/Quality Assurance for qualifications in test procedures not covered by ASTM or AASHTO.

APPENDIX I

I2MS VERSION 3.2 CONTINUOUS ANALYSIS ALGORITHM

The following describes the I2MS 3.2 algorithm used in the continuous statistical analysis referenced in Appendix D – OV Levels for Materials Testing Validation/Verification.

Categorizing for Analysis

When a test version record is saved to I2MS, the first step is to assign it to any applicable analysis categories. A test record must have Sample Type "Random-Independent" or "Random-Split" to be associated with any category[1]. Assignment to a category is made immediately when the record enters the system, but the record will not be included in any analyses until it is set "For Analysis" (i.e., it is Approved or intermediate break data are Reviewed).

Note: A new version of an existing record can actually belong to a different analysis category than a previous version if the header values were changed. This is not a problem, because an analysis run represents a snapshot of the current data in the system at the time of the analysis.

Finding Categories to Analyze

Every night, I2MS scans data in the system for categories that need to be analyzed. A category is triggered for analysis whenever a NEW OV record appears. A record is new if it is For Analysis and has never been analyzed before. Some examples of new OV records are:

- A test was added and approved today;
- A test was added a month ago and approved/reviewed today; or
- A test that was added and analyzed last week was revised and reapproved. This new version has never been analyzed, so it will trigger an analysis the same as if it were the first version of the record.

Analyzing a Category

The first step in the analysis is to find the date range of the analysis populations. The age of a record is determined by its SAMPLED DATE.

I2MS has a desired maximum number of days that can be configured in Project Settings. By default, this is 90 days. Also configurable is the desired maximum number of OV records to include in one analysis run. This defaults to 25 records.

The end date of analysis will always be the current date. The start date of the analysis is determined by the following:

- If there is an unanalyzed record for either the OVF or IQF that is OLDER than 90 days, the start date is that record's Sampled Date. Analysis will run on ALL records from that date forward;
- If there are fewer than 25 OV records within the previous 90 days, the start date will be 89 days before the current date (i.e., 90 days total in the analysis); and
- If there are 25 OV records or more within the previous 90 days, use a smaller date range. The Sampled Date of the 25th OV record before the current date will be the start date of the analysis.

The next step is to pull all the data points for the analysis. Pull values for all "For Analysis" OVF and IQF records between the start date and the end date, using ONLY the latest versions of those records.

Finally, perform the F- and t-test statistical analysis and save the P-values for review by the materials manager. The analysis requires at least two points from each population to calculate. If there are fewer than two data points for either OVF or IQF, skip the analysis. The category will be picked up again the next time an approved OV record is received.

[1] These restrictions can be reconfigured at the analysis-group level (e.g., Concrete, Asphalt) if the list of Sample types or the business rule changes.

APPENDIX J

MINIMUM CONSTRUCTION HOLD POINTS

The minimum milestones at which construction Independent Quality (IQ) hold points must be established include, but are not limited to, the following.

Environmental Mitigation Measures

A. Before crossing any stream, dewatering, diverting watercourses, or building cofferdams;
B. Before beginning construction for conformance with the Storm Water Pollution Prevention Plan (SWPPP) and NPDES permit; and
C. Verify that the DB Contractor's Environmental Compliance Manager is monitoring and maintaining temporary erosion control devices and other Best Management Practices (BMPs) bi-weekly and after each rainfall event of 1/2 in. or more.

Embankments

A. One per shift per crew for drainage and utility installation with IQ pre-backfill inspection documentation for all associated work provided at the hold point;
B. After all clearing, grubbing, and excavation, before embankment placement;
C. Before beginning borrow pit excavation for permissions and materials testing;
D. Per specifications for lift requirements (applicable to all embankments, including walls);
E. Before removal of surcharge; and
F. Before placing embankment or MSE backfill on ground improvements.

Drainage

A. Before placing drainage pipe for bedding and pipe conditions;
B. After pipe placement and bedding compaction and before beginning backfill;
C. After backfill for roundness of pipe and other defects; and
D. Before opening for structure grouting and pipe and structure cleanliness.

Structures

Bridges

A. At completion of bridge embankment settlement and before start of bridge foundation pile driving;
B. At IQ approval of pile-driving submittals (including design calculations, wave analysis, and hammer specification);
C. After completion of pile driving at each structure support (pile group), including pile-driving results and records;
D. After excavation for drilled shafts and spread footings;
E. Before sonic logging drilled shafts;
F. Before beginning drilled shaft remediation, if needed;
G. Before placement of reinforced concrete in superstructure and substructure elements, including pre-drilled piling;
H. Before and after construction of MSE fill system behind abutments;
I. After removal of unsound bridge deck concrete from existing bridges;
J. Before and after structural steel erection;
K. Before allowing traffic below erected structural steel girders or concrete beams;
L. Before and after post-tensioning and grouting operations;
M. Before backfilling bridge components;
N. Before placement of reinforcing steel above permanent steel stay-in-place deck forms and above partial-depth precast concrete deck panels; and
O. Before filling full-depth concrete deck panel grout pockets.

Walls

A. Before placement of wall on ground improvements;
B. Before placement of leveling pad for any retaining wall system;
C. After placement of every 10 ft. (measured vertically) of MSE wall panels or blocks;
D. Before placement of reinforced concrete;
E. After rebar placement but before final form placement for cast-in-place retaining walls;
F. Before backfilling at any type of retaining wall system;
G. Before and after post-tensioning and grouting operations for tie-back anchors and soil nails;
H. During soil nail anchor verification test (before production);
I. During proof testing of production nails;
J. During placement of drains and welded wire mesh for soil nail walls; and
K. Before placement of shotcrete for soil nail walls.

Drainage Box Structures

A. After excavation for drainage box structures;
B. Before placement of reinforced concrete for drainage box structures;
C. After rebar placement but before final form placement for drainage box structures taller than 6 ft.; and
D. Before backfilling drainage box structures.

Sign, Signal, Lighting, and ITS Support Structures

A. Before installation of foundations for sign, signal, lighting, and ITS support structures; and
B. During installation of sign, signal, lighting, and ITS structures.

Signs and Pavement Markings

A. Before installation of material; and
B. During installation.

Temporary Structures

A. Before allowing traffic on, below, above, or adjacent to temporary structures, shoring, or bracing.

Surfacing, Paving, and Concrete

A. After batch plants are set up, for calibration;
B. Before placement of each course above subgrade on roadway components (e.g., treated base and granular base);
C. Before placement of each lift of asphalt or PCC paving on roadway components; and
D. Before any placement of concrete.

Traffic Devices and Management of Traffic

A. Before opening to traffic;
B. Before implementation of a full or partial closure on any roadway; and
C. Before changing the traffic configuration or alignment on any roadway.

APPENDIX K

EXAMPLE ENGINEERING JUDGMENT AGREEMENT

July 1, 2017

Mr. Q.M. Jones
Independent Quality Firm Manager
Top Quality Engineering
1000 Mockingbird Lane
Dallas, TX 75207

Reference: Example Design-Build (DB) Project, TxDOT Contract No. 41-3XXDB012
Subject: Delegation of Engineering Authority

Dear Mr. Jones:

Attached to this letter please find the guidelines for delegation of engineering authority and acceptance decisions for the example DB project. This list may be revised periodically.

Sincerely,

Dusty Rhodes, P.E.
Project Manager

cc: Bobby Builder, DB Project Constructors

EXAMPLE DB PROJECT AGREEMENT FOR DELEGATION OF ENGINEERING AUTHORITY AND ACCEPTANCE DECISIONS

The intent of the delegation of engineering authority is to provide some latitude at the field level for the IQF to allow work to continue for minor deviations from the specification requirements where materials will otherwise meet the intent of the design or where rejection of materials poses a larger threat to the quality of the project. Delegation to the IQF does not release TxDOT from responsibility to monitor and review the IQF decisions because TxDOT cannot delegate material acceptance.

TxDOT is required to provide FHWA with a Final Materials Certification when the project is complete. This Materials Certification is TxDOT's certification that materials used on the project meet the approved plans and specifications for the project, except as noted. The documentation for any exceptions must be provided to TxDOT for inclusion in the OV reports.

When TxDOT submits the OV reports to FHWA, TxDOT must be in agreement that the IQF and OV EJ logs, and NCR portions of the report, are complete and that TxDOT is in agreement with the decisions included in those logs.

EJ to accept material or work failing specification requirements:

1) Engineering authority is delegated to the IQFM or designees with the exception of those inspection and testing items that might: 1) affect the safety of project personnel or the traveling public, or 2) conflict with approved shop drawings or erection manuals;

2) The individual making the EJ will apply sound engineering practices to verify quality of accepted material and will document his or her acceptance and justification in the EJ log; and

3) The IQF records management system will be capable of generating an EJ log that is sortable by test procedure, date range, and material from each specification. The log will include the comments explaining the logic in making each judgment and the magnitude of the deviation from specification requirements. This log will always be available to TxDOT.

The development of the Project must proceed with a reasonable approach to the quality duties of the IQF and the extension of the IQF's ability to render decisions in the field with regard to the Work performed. TxDOT recognizes that the IQF is an element of the DB Contractor's team working to progress the development of the Project for TxDOT, and working alongside the DB Contractor who is responsible for compliance. TxDOT recognizes that the IQF should be afforded the opportunity, in concert with their independent role, to render engineering decisions with respect to appropriate documents for inspection and testing as long as the following conditions are met:

A. Engineering decisions will be delegated no lower than an engineer in charge of a section of the Project. This engineer may be an employee of TxDOT, the OVF, or the IQF, and must be a licensed professional engineer in the State of Texas. Engineering decisions will be within an individual's area of expertise;

B. EJ to accept material or Work failing specifications will never be applied solely to promote "partnering" or to "help out" the DB Contractor. The Project's quality will be regarded as the highest order of concern. Schedule is a secondary consideration with respect to quality delivery of the Project;

C. If these guiding principles do not address the situation, the individual applying EJ must provide a decision to TxDOT regarding whether material failing to meet specification requirements and not within applicable tolerances should be accepted, based on sound engineering principles, experience, and/or related results of applicable material tests;

D. EJ to accept materials or Work failing specification requirements will be applied only in cases where natural resources may be lost that will otherwise meet the intent of the design (e.g., strength tests vs. slump requirements), rejection of material endangers quality or loss of a larger or more significant item (e.g., by rejecting load of concrete, a structure element subject to a cold joint, or reflective cracking), or another issue unduly threatens the overall quality/schedule of the Project. In general, EJ is typically allowed on factors that are only indicators of final product quality, such as slump, or are "rules of thumb" written into specifications, such as the number of mixing revolutions or time to discharge since batching. Use of judgment supported by logical engineering analysis of the actual situation/conditions can allow production to continue. Materials that fail to meet the specification requirement may continue to be used as long as adjustments are made by the contractor to correct the cause of the failing factor (e.g., concrete failing slump, or mixing time or over-revolutions may still produce concrete exceeding design strength). It is advised that strength samples should be taken as fixed independent tests in these situations to verify the ultimate strength of the load of concrete, for instance;

E. EJ should not be used by the IQF on test results that are the ultimate acceptance criteria for the item, such as concrete compressive strength, density of HMAC, pavement thickness, deck thickness, and cover on steel. These are generally not field situations that can be adjusted to correct during ongoing production or immediately necessary to sustain production. They are factors that ultimately determine whether the product that is furnished meets contract and design requirements, and affect performance, durability, and maintenance of the product. Accepting failing tests in these areas should be through the NCR process only after analysis and consideration by the EOR and TxDOT, and may include assessment of liquidated damages;

F. Failed results of material tests may be accepted only for individual tests. Patterns of failure will not be accepted, will be considered a breakdown in Quality Control activities, and will be addressed in the CQMP. Recurring use of EJ for the same plan or specification deviation should result in process corrections to the construction operations to assure material and Work are conforming to plan and specification requirements. In general, if failing tests are 5% or less and the process is consistent, then that process is generally under control. If failing tests rise to 8% or more, then increased process control testing and process adjustments are needed to return to a uniform controlled process. The intent of delegating EJ authority to the IQF is not to allow widening of a specification requirement continuously, but to allow for reasonable production efforts to adjust and control their processes by the DB Contractor;

G. The IQFM may use EJ to direct an amount of acceptance testing greater than the required minimum when deemed necessary. The IQFM must document any variations from the prescribed frequencies;

H. The individual making the EJ will apply good engineering practices to ensure quality of accepted material by making additional tests, such as through engineering analysis, and will document his or her acceptance and justification;

I. EJ in acceptance of material or Work not meeting specification requirements will be applied only to situations that are technically sound, in consideration of localized conditions. EJ will not be used to waive specifications for conditions that have projectwide implications. The acceptance of materials or Work not meeting specifications in one instance at a location will not become a corridorwide or projectwide decision. Each situation will be judged on the merits of its unique characteristics;

J. TxDOT may, at any time, remove EJ authority from the IQFM in specific circumstances;

K. TxDOT and FHWA have oversight agreements in place that require specific documentation relating to non-conforming material that is allowed to remain in place. Any instance of the application of these guiding principles will be accompanied by appropriate documentation;

L. The IQF is encouraged, but not required, to consult with TxDOT before making acceptance decisions;

M. IQF personnel are not placed, or do not appear to be placed, in a position that exhibits signs that they were pressured by the DB Contractor to accept, approve, or continue the duties of the IQF scope of work as detailed in the Project under duress; and

N. Excessive use of EJ in any specific area, as determined by the IQF or TxDOT, will require a Corrective Action Report (CAR) by the DB Contractor that will include a root cause analysis for the repeated non-compliance with the specification requirement, and actions to eliminate or significantly reduce the use of EJ in that area. Anyone involved in the project can initiate a CAR.

EXAMPLE DB PROJECT
ENGINEER DECISION DELEGATION LIST

The following list represents opportunities extended to the IQFM to exercise EJ with respect to reference within the TxDOT 2024 Standard Specifications. This is a supplement to Section 3.6.3.3 – Engineering Judgment and serves as the guiding principles on this project. The specification issues listed in the Agreement should include how much latitude will be allowed to the IQF to use EJ in each situation.

Specification Issue	Comment
1. Concrete slump deviation from specification	The IQFM may exercise EJ and accept materials that do not meet the specified requirement. The basis of acceptance will be documented on the test form and compiled into a list for attachment to the letter to FHWA of Certification of Materials Used.
2. Concrete air content not meeting specification requirements (ref: Section 421.4.2.4 and 421.4.8)	The IQFM may exercise EJ and accept materials that do not meet the specified requirement. The basis of acceptance will be documented on the test form and compiled into a list for attachment to the letter to FHWA of Certification of Materials Used.
3. Deviation from 1-hour time between successive concrete lifts (ref: Section 420.4.7.8, par 5)	The IQFM may exercise EJ for deviation from the 1-hour specification when the first two sentences of this paragraph are attained.
4. Deviation from specified concrete discharge time (ref: Section 420.4.7.2 and 421.4.6.2, Table 14)	The IQFM may exercise EJ.
5. Materials acceptance while deviating from optimum moisture requirements	The IQFM may exercise EJ and accept materials that do not meet the specified requirement. The basis of acceptance will be documented on the test form and compiled into a list for attachment to the letter to FHWA of Certification of Materials Used.
6. Construction joint parallel to toewall of riprap under bridge structures involving streams or creeks	The IQFM has the authority to permit construction joints in this example.
7. Optimum moisture deviation specifications in embankment construction	The IQFM has the authority to render engineering decisions regarding deviations in attainment of optimum moisture content based on sound engineering principles.

Specification Issue	Comment
8. Standard plan sheets for wingwalls and headwalls for box culverts ("When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.")	TxDOT is comfortable with the IQFM making this decision with the following condition. If the toewall is deleted, please dowel #5 bars at 2'-0" C-C maximum into the rock at the end of the apron. The dowels should be grouted into the rock at a depth of 6 inches minimum and should extend up into the apron a distance of Z-2".
9. Barricades, signs, and traffic control	The IQFM is designated to be the Engineer in regard to decisions, except for the following conditions held solely by TxDOT as operational items: • Lane closures and all associated items (e.g., time, duration, and notification); • Narrow lanes (<12 feet); and • Notifications (including message board wording). Items associated with proper implementation of traffic control items and making minor site-specific adjustments to adapt the approved plan to field conditions are incorporated in this delegation list and managed by the IQFM.
10. Item 421	The IQFM is delegated the decision to not perform air content tests on concrete where the specifications do not have a requirement for air content but the supplier has chosen to include air entrainment admixture into the batch of concrete, as long as the amount of air entrainment admixture included is at or below the mix design requirement. The IQFM will maintain a database of concrete strength results for each class of concrete.
11. Special Provision 420-013	The IQFM is delegated the engineering decision to determine authorization for construction traffic before the application of concrete surface treatment.
12. Soil retention blanket	The IQFM is delegated the engineering decision to recommend and approve alternate placements of soil retention blankets to those shown on the ESOC plans, in temporary work plans, or in RFC documents. (This example applies only if the ECM role is incorporated as part of the IQF.)

Specification Issue	Comment
13. CRCP groove depth	The IQFM is delegated the engineering decision to approve deviation from the specified depth of grooves (ref: Section 360.4.8.3).
14. Non-swell zone PI acceptance	The IQFM may accept materials within the non-swell zone with the inclusion of percent binder with the PI of the material placed.
15. Sprinkling of aggregate	The IQFM is delegated the decision authority for the sprinkling of stockpile aggregated.
16. Bridge beam clearance to backwall	The IQFM is delegated the decision to adjust clearances between the ends of beams on bridges. Clearances approaching 1-1/2 inches between the end of a beam to the face of the abutment backwall will require TxDOT concurrence.
17. Rock riprap	The IQFM is delegated the ability to make engineering decisions regarding the acceptance of rock riprap.
18. Hot-mix asphaltic concrete pavement placement air temperature	The IQFM is delegated the engineering decision to determine acceptable limits of deviation from pertinent specification requirements for air temperature before placing mix.

Specification Issue	Comment
19. HMA mixes	The IQFM is delegated the ability to make engineering decisions for minor deviations from the allowable operational tolerances detailed in the applicable specification. Mixes shall be within the allowable operational tolerances and required specification limits as detailed in the applicable specification. The allowable difference from JMF target values is included in the operational tolerance table of the applicable specification. Example EJ delegation for Item 341: **LMD:** EJ may be used if the absolute deviation from target LMD is between 1.1% and 1.3%. Corrective actions shall be implemented by the DB Contractor to correct these deviations as required per the specifications. Per specification, remove and replace if absolute deviation from target LMD is >1.8%. **Asphalt Content**: EJ may be used if deviation is between 0.4% and 0.5% from the current JMF target value. Corrective actions shall be implemented by the DB Contractor to correct these deviations as required per the specifications. **In-Place Air Voids**: EJ may be used to accept a sublot if the average test result is within 3.5%–3.7% and 8.6%–9.1%. Corrective actions shall be implemented by the DB Contractor to correct these deviations as required per the specifications. Per specification, remove and replace if test result is >9.9% and <2.7%.
20. Riprap layout	The IQF is delegated the engineering decision authority from TxDOT to make decisions regarding alterations from riprap geometry indicated on RFC drawings.
21. CTSG PI >25	The IQFM is delegated the decision ability to accept subgrade materials with a PI greater than 25 for treatment with cement.

Specification Issue	Comment
22. Engineer for hot-mix specification	1. TxDOT will be the Engineer for the determination of lot size, incompletion lot, and small quantity lot. 2. A default lot size of 1,600 tons will be used by the IQFM for the corridorwide hot-mix work, with the stipulation of: (a) IQFM will close the lot as "incomplete" if the lot is not completed within two days; (b) IQFM will close the lot if the IQFM has taken the fourth IQF sublot sample and the production at the end of the day has not reached 1,600 tons; and (c) lot size different from 1,600 tons must be by request and approved by TxDOT on a case-by-case basis. 3. TxDOT will make the decision regarding small quantity lots.

APPENDIX L

ENGINEERING JUDGMENT LOG

IQF ENGINEERING JUDGMENT (EJ) LOG

[PROJECT NAME]

20##, Quarter #

EJ No.	Date Issued	Discipline	Location	Specification Requirement	Description and Magnitude of Deviation	Engineering Judgment Justification	Engineering Judgment By	Status (Open or Closed)	Date Closed

OVF ENGINEERING JUDGMENT (EJ) LOG

[PROJECT NAME] 20##, Quarter #

EJ No.	Date Issued	Discipline	Location	Specification Requirement	Description and Magnitude of Deviation	Engineering Judgment Justification	Engineering Judgment By	Status (Open or Closed)	Date Closed

APPENDIX M

NON-CONFORMANCE REPORT LOG

NON-CONFORMANCE LOG

[PROJECT NAME]

20##, Quarter #

NCR No.	Date Issued	Discipline	Originator	Description of NCR	Location	Description of Solution to the NCR	Disposition	EOR Review/ Approval Date	TxDOT Concurrence Date	Corrective Action Complete Date	Status (Open / Closed)	Date Closed	Non-Compliance Points Assessed (Yes/No)

APPENDIX N

EXAMPLE OF INSPECTION REPORT FORM

Inspection Report Form - Sample

		Inspection Report No.	
Project Name		Inspected Date	
Controlling CSJ #		Inspection Type	
Weather		Temperature	
Section		Spec Item	
Feature		Roadway	
Alignment		Direction	
Station From		Station To	
GPS Longitude		GPS Lattitude	
Element #		Location Description	
RFC Sheet #(s)		Related CDR(s)	
Related NCR(s)		Related RFI(s)	
Sample/Test ID(s)		Previous Fail Inspection Report No.	

Inspection Observations

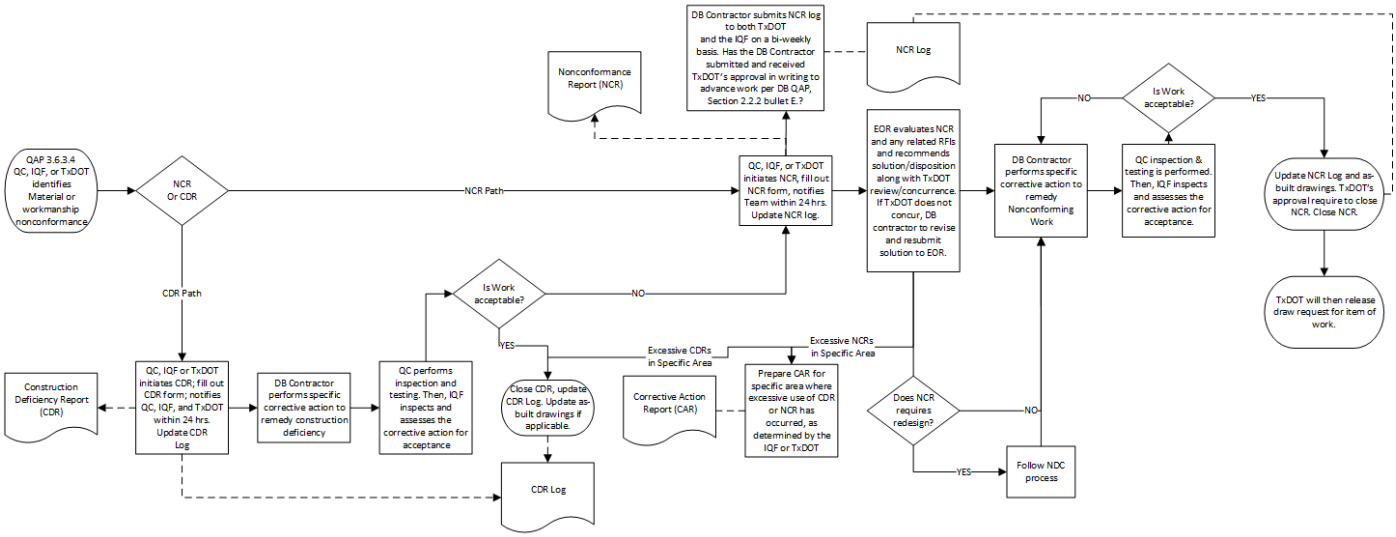
Conversation Log

Inspection Result			
Inspector		Inspector Submitted Date	
Supervisor		Supervisor Reviewed Date	

APPENDIX O

NON-CONFORMANCE WORK PROCESS

QAP 3.6.3.4
Nonconformance and Construction Deficiency Process



Key Definitions & Terms

Construction Deficiency Report (CDR)—a report of how Construction Deficiency Items have been documented and resolved.

Corrective Action Report (CAR) — a root cause analysis for the repeated noncompliance with the specification requirement and actions to eliminate or significantly reduce the use of engineering judgment in that area. Anyone in the project can initiate a CAR

Engineer of Record (EOR) —the engineers in responsible charge of each item, element, or phase of the Work shall possess the necessary licenses and registrations in the state of Texas and will be personally responsible for directly supervising the Work. The EOR will sign and seal the Professional Services product for a given item, element, or phase of the Work as applicable.

Independent Quality Firm (IQF)—the independent firm identified in the Proposal (or such other firm approved by TxDOT in its discretion) responsible for managing the quality assurance program for the Construction Work and performing independent quality sampling, testing, inspection, and audits of the CQMP

Nonconforming Work (Nonconformance)—Work that does not conform to the requirements of the Contract Documents, the Governmental Approvals, applicable Law, ESOC plans, or RFC Documents.

Nonconformance Report (NCR)—a report documenting Nonconforming Work and the ultimate disposition of such Nonconforming Work, including the efforts undertaken to repair, replace, or otherwise remediate such work in accordance with the Contract Documents.

Team — TxDOT, IQF personnel, Engineer of Record and DB Contractor's QC staff

APPENDIX P

ARCHIVED VERSIONS

The following archived versions of this document are available.

- Effective November 24, 2008–February 28, 2010:
  https://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_1108.pdf
- Effective March 1, 2010–May 10, 2010:
  https://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_0310.pdf
- Effective May 11, 2010–July 24, 2011:
  https://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_0510.pdf
- Effective July 25, 2011–October 25, 2016:
  https://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_0711.pdf
- Effective October 26, 2016–August 28, 2017:
  https://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db_1016.pdf
- Effective August 29, 2017–October 26, 2020:
  https://ftp.dot.state.tx.us/pub/txdot-info/cst/qap_db.pdf
- Effective October 27, 2020–August 2,2024:
  https://www.txdot.gov/content/dam/docs/division/mtd/qap-db-1020.pdf